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NATO Performance Assessment Questionnaire (PAQ):

PAQ Project, Questionnaire Design and Reliability of Responses

J.L. Colwell

Defence R&D Canada

Technical Memorandum
DREA TM 2000-141
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Abstract

The NATO Performance Assessment Questionnaire (PAQ) was developed to obtain a large database on fatigue, motion sickness and task performance problems associated with ship motions in the naval environment. The PAQ was deployed on seven ships of the NATO Standing Naval Forces Atlantic fleet (STANAVFORLANT), during combat training exercises in February and March of 1997. Overall, 1026 personnel returned PAQ booklets completed over an 11 day period, providing a very large database on fatigue and motion sickness symptomatology, and on coincidental task performance problems. Additionally, two ships were instrumented to measure motions. This Technical Memorandum documents the PAQ physical format and content, including all five languages used in the NATO deployment. Response rates from each ship are defined, and personnel demographics are summarized. The entry of data from PAQ booklets into a computer database is described, and a reliability assessment of responses from each ship is presented.

Résumé

Le questionnaire sur l'évaluation du rendement (QER) de l'OTAN est conçu pour établir une vaste base de données sur la fatigue, le mal de mer et les difficultés d'exécuter des tâches, le tout lié aux mouvements des navires, dans la force navale. Le QER a été utilisé sur sept navires de la flotte de la Force navale permanente de l'Atlantique (STANAVFORLANT) de l'OTAN pendant les exercices d'entraînement de février et mars 1997. Dans l'ensemble, 1026 membres du personnel ont retourné les livrets QER dûment remplis en une période de 11 jours, fournissant une vaste base de données sur la symptomatologie de la fatigue et du mal de mer ainsi que des problèmes d'exécution de tâches correspondants. Deux autres navires ont été instrumentés pour mesurer les mouvements. Le présent document technique montre la forme et le contenu du QER, y compris les cinq langues dans lesquelles celui-ci a été utilisé à l'OTAN. Il précise les taux de réponse par navire et indique brièvement des données sur les effectifs. On y décrit la manière de saisir les données des livrets dans une base de données informatique et on présente une évaluation de la crédibilité des réponses reçues de chaque navire.

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Executive Summary

Introduction

The NATO Performance Assessment Questionnaire (PAQ) was developed to obtain a large database on fatigue, motion sickness and task performance problems associated with ship motions in the naval environment. The project was initiated in 1990 at DREA, and was sponsored by the NATO Naval Armaments Group, Naval Group 6 on Ship Design (NNAG NG/6) for deployment NATO's Standing Naval Forces Atlantic fleet (STANAVFORLANT). Permission to deploy the PAQ on STANAVFORLANT was granted in 1994 by Strategic Allied Commander, Atlantic (SACLANT). The PAQ was deployed in 1997 on seven frigates and destroyers, during two weeks of intensive combat training exercises in the winter North Atlantic.

Results

Over 1000 PAQ booklets were returned from the seven frigates and destroyers involved in this project. The resulting PAQ database contains over 16,500 completions of the 41-parameter 'Symptoms' and 'Performance' sections of the PAQ. This report focuses on development of the PAQ, and documents the contents of the PAQ, as deployed on STANAVFORLANT, in Dutch, English, French, German, and Spanish. PAQ response rates per ship varied from a high of almost 90% of the crew on two ships, to a low of 30% on one ship. A reliability assessment of responses from each ship is made, and crew demographics are summarized.

Significance

The PAQ database is a unique source of information on the types and severity of naval task performance problems, and for examining potential causal relationships between ship motions, fatigue, motion sickness, and task performance problems. The database will provide guidance on establishing priorities for future R&D on human performance problems, and also provides new data for developing ship design and operational guidance methods which were previously not possible.

Colwell, J.L. 2000. NATO Performance Assessment Questionnaire (PAQ): PAQ Project, Questionnaire Design and Reliability of Responses. DREA TM 2000-141.
Defence Research Establishment Atlantic.

Sommaire

Introduction

Le questionnaire sur l'évaluation du rendement (QER) de l'OTAN vise l'établissement d'une vaste base de données sur la fatigue, le mal de mer et les difficultés d'exécuter des tâches, le tout liés aux mouvements des navires de la force navale. Le projet, lancé en 1990 au CRDA, a été parrainé par le Groupe naval 6 sur la conception de navires, Groupe OTAN sur l'armement des forces navales (NNAG NG/6), pour être utilisé sur la flotte de la Force navale permanente de l'Atlantique (STANAVFORLANT). En 1994, le commandant stratégique allié de l'Atlantique (SACLANT) a accordé la permission d'employer le QER sur la flotte de la STANAVFORLANT. Le QER a été utilisé en 1997 sur sept frégates et destroyers pendant deux semaines d'intensifs exercices d'entraînement au combat, passés en hiver dans l'Atlantique Nord.

Résultats

Plus de 1 000 livrets QER ont été retournés par les sept frégates et destroyers ayant participé au projet. La base de données qui en résulte contient au moins 16 000 des sections à 41 éléments du QER, intitulées « Symptômes » et « Évaluation », toutes remplies. Le présent rapport se focalise sur la mise au point du QER et fournit le contenu de ce dernier tel qu'il a été utilisé sur la flotte de la STANAVFORLANT, en hollandais, en anglais, en français, en allemand et en espagnol. Les taux de réponse au QER par navire varient d'un haut de presque 90 % (deux navires) à un bas de 30 % (un navire). Une évaluation de la crédibilité des réponses de chaque navire est exposée et des données sur l'équipage, brièvement présentées.

Signification

La base de données établie d'après sur le QER est unique comme source d'information sur les types et la gravité des problèmes d'exécution des tâches en mer et pour examiner les relations de causalité potentielles qui existent entre les mouvements des navires, la fatigue, le mal de mer et les problèmes d'exécution de tâches. La base de données fournira des indications quant à établir les priorités de la future R-D concernant les problèmes de performance humaine. Elle procurera également des données utiles à la conception de navires et à l'élaboration de méthodes servant à orienter les opérations, ce qui auparavant s'avérait impossible.

Colwell, J.L. 2000. Questionnaire sur l'évaluation du rendement (QER): Projet QER Conception du questionnaire et crédibilité des réponses. CRDA TM 2000-141.
Centre de recherches pour la défense Atlantique.

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The author thanks all members of STANAVFORLANT who participated in this project, and assures them that their input is an important contribution to naval science. Gratitude is extended to SACLANT and his staff for providing access to the fleet, and to Canadian Forces Maritime Command for their assistance. Special thanks to the 'ABCD working group' for their continuing guidance and spirited discussions on what should, and should not, be in the PAQ (and what does it mean, anyway?), and to the many people at TNO (Netherlands) and Dalhousie University (Canada) for their help in producing the PAQ translations. Finally, thanks to Mr. Ed Brunt, at DREA, without whose technical support this trial would probably not have been successful, and to my three children, Megan, Trevor and Jordan, who drove the three extra staples through each of the 1707 PAQ booklets.

1.0 Introduction

The NATO Performance Assessment Questionnaire (PAQ), was developed as an instrument for obtaining a large database on fatigue and motion sickness symptoms, and task performance problems associated with ship motions, as experienced during naval operations. This database will be used in two general ways:

1. define the types and severity of task performance problems encountered in the naval environment - this will help provide guidance for setting future priorities on human performance research, development and engineering activities; and,

2. examine correlations between task performance problems and associated fatigue and motion sickness symptoms, to determine if statistical estimators can be developed for ship design and operational guidance (at present, no analytical models exist for this purpose).

The PAQ also identifies a variety of "other" types of problems (e.g. noise, lighting, temperature, etc.) which may highlight performance problems related to specific technologies or operating procedures on individual ships.

This Technical Memorandum documents the development of the PAQ, and provides detailed information on the number and reliability of responses received from its deployment on the NATO Standing Naval Forces Atlantic fleet (STANAVFORLANT). The types and severity of reported problems and key correlations between ship motions, fatigue, motion sickness and task performance are summarized in Reference 1, which focuses on a sub-set of the PAQ parameters. A companion Technical Memorandum [2] provides details of problem severity and correlations for all PAQ parameters.

This Technical Memorandum begins with a brief summary of the PAQ project history, followed by detailed descriptions of the five versions of the PAQ (Dutch, English, French, German, and Spanish), as deployed on STANAVFORLANT. The development of a computerized database of PAQ responses is described, followed by a detailed review of the responses received from each ship. Personnel demographics are summarized, and the reliability of each ship's responses is assessed. Throughout this paper, individual ships are identified using alphabetic labels. Generally, individual ships are not identified; however, 'Ship D' is a Canadian HALIFAX class frigate.

2.0 PAQ project and questionnaire development

Following a review of human factors in the naval environment [3], the PAQ was developed at DREA, and became a working paper [4] of the NATO Naval Armaments Group, Information Exchange Group 6 on Ship Design, Sub-group 5 on Seakeeping (NNAG IEG/6 SG/5). The final documentation for this first version of the PAQ is at Reference 5. The version of the PAQ used in the 1997 STANAVFORLANT deployment was somewhat modified, based on experience from informal pilot studies and sea trials, and is fully documented in this Technical Memorandum.

The formal name of the PAQ has changed over time:

1990 Sea Sickness, Fatigue and Performance Assessment Questionnaire;
1997 NATO Fatigue and Seasickness Performance Assessment Questionnaire; and,
2000 NATO Fatigue, Seasickness and Task Performance Assessment Questionnaire

These name changes reflect the relative importance and recognition of fatigue as a serious problem, and the PAQ's strong emphasis on assessing task performance (most previous work has focused on comfort).

Major datas and events in the PAQ project are listed below.

1990 draft PAQ introduced to NNAG IEG/6 SG/5.
1991 SG/5 adopts PAQ as working paper [3].
1993 PAQ development completed [4].
1994 SACLANT approval granted for STANAVFORLANT deployment,
deployment deferred while fleet in Adriatic Sea.
SG/5 disbanded, IEG/6 (now NG/6) becomes NATO sponsor for PAQ.
1997 PAQ deployed in STANAVFORLANT (24 February - 8 March):
lead nation Canada (DREA);
assisted by UK (DERA Haslar, and Institute for Naval Medicine).
2000 open literature summary published on problem severity and correlations [1].

Both SG/5 and the ABCD working group on human performance at sea have made substantial contributions to the PAQ, as it evolved from 1990 through 1997. The ABCD working group is an *ad hoc* association of American, British, Canadian and Dutch naval and scientific research agencies. This group jointly sponsors ship motion simulator experiments and sea trials on the effects of ship motions on human task performance in the naval environment [e.g. 6]. The current author is the Canadian delegate to the ABCD group.

3.0 Questionnaire contents and format

The PAQ is arranged in four sections: Personal Information; Symptoms; Performance; and, General Comments. The Personal Information section was completed once, at the beginning of the trial. The Symptoms and Performance sections are presented in the questionnaire booklet as matched-pairs, on the left and right-hand pages, respectively. Ideally, these sections were completed by each subject while on watch, at about one hour before the end of every watch. The Symptoms and Performance section parameters are grouped as follows.

1. Sleeping problems before coming on watch
   - quality and duration of sleep
   - cause of sleep problems: ship motions, seasickness, and/or other

2. Symptoms experienced during watch
   - mental fatigue, physical fatigue, sleepiness
   - headache, apathy, tension/anxiety
   - vomiting, nausea, stomach awareness

- seasickness scale, seasickness medication taken, vomiting incidence

3. Task performance problems during watch
   - cognitive: making decisions, concentration, memory, simple mental tasks
   - physical: balance, carrying/moving things, hand coordination, vision

4. Task completion problems during watch
   - making more mistakes, taking longer than usual
   - task not completed in time, abandoning task , not allowed to attempt ta[illegible]

5. Other problems during watch
   - cold/flu, air quality, noise, vibration, lighting, temperature

Each category also has an 'other' parameter where the subject can define the type and severity of a problem not specifically described. The actual phrasing and layout of the PAQ are discussed in the next section. The seasickness scale is a simplified form of the TNO MISC index [7]. Problems with vision are grouped with physical task performance, but it is well recognized that such problems can also be associated with cognitive processes.

All parameters are based on current conditions, except for sleep problems, which focus on the recent past. Most parameters are subjective, but some are less so (e.g. had to abandon tasks). Reliability issues are discussed later; however, an important question remains: how can a person report on problems of which he or she is not aware? This is not answered here, but future plans for validating the PAQ will attempt to address this.

3.1 Questionnaire translations

The PAQ was deployed in five languages, as shown in the following annexes.

Annex A	Dutch
Annex B	English
Annex C	French
Annex D	German
Annex E	Spanish

The English-language original version of the PAQ was developed at DREA. Translations to French, German and Spanish were provided by graduate students in language studies at Dalhousie University, Halifax. The Dutch translation was provided by colleagues at the Netherlands TNO Human Factors Research Institute, Soesterberg. All translations were reviewed by third-parties to help ensure that the translations were a faithful representation of the original.

3.2 Physical format

The PAQ was assembled in a 5.5" x 8.5" booklet format, formed by folding and stapling 11" x 8.5 pages (North American letter size paper, in landscape orientation), on both sides of which were printed the PAQ contents, in "2 up" portrait format. Each page in Annexes A through E is enclosed in a 5.5" x 8.5" frame, to illustrate the actual size of the booklet.

The booklet cover was of thicker card stock, with a title and place for the subject's name on the front, and the "General Information" section on the inside cover, to describe the reasons for this trial, and to assure confidentiality of individual responses. The intent for naming the cover of each booklet was to reduce losses during the trial period. Before returning the PAQ, each subject removed the cover. This worked well, and avoided difficulties with legislation regarding anonymity of voluntary questionnaires in some of the ships' home countries.

The first page inside the PAQ cover is the single-page Personal Information section, followed by sufficient matched-pairs of Symptoms and Performance sections for the duration of the trial. The last page inside the PAQ back cover was for general comments, and the back cover itself was left blank.

In response to comments from a colleague regarding the physical integrity of booklet questionnaires, the two spine-staples placed by the machines used to produce the PAQ were supplemented by three, large staples hand-driven through each booklet, from top to bottom. None of the completed booklets had any pages missing, although many had been put through considerable stress.

4.0 STANAVFORLANT deployment

The PAQ was deployed on STANAVFORLANT during combat training exercises in the northern North Atlantic, over the period 24 February through 8 March, 1997.

4.1 Ships

Seven ships, all frigates and destroyers, participated in this project. Table 1 summarizes the general characteristics of these ships [8]. Six of these ships comprised STANAVFORLANT, and the seventh was part of a rival fleet, against which the combat exercises were conducted. The ships shown in Table 1 are sorted alphabetically according to country, which is a different order than used for the A through G alphabetic ship labels. The year data in Table 1 define the year of commissioning for the first of class of each ship. For the GE and SP ships, the year is defined by the 'parent' US C.F. ADAMS and KNOX classes, respectively.

Table 1: Ship characteristics [8]

Country	CA	GE	NL	SP	UK	UK	US
Ship Class	HALIFAX	TYPE 103	DOORMAN	BALERES	TYPE 22	TYPE 42	PERRY
Displacement (t)	5235	4500	3320	4177	4900	4100	3638
Length (m)	135	133	122	134	148	125	138
Year	1992	1960	1991	1969	1988	1976	1977
Complement	225	337	154	256	250	253	206

In addition to deploying the PAQ on the seven ships, two of the ships (D and G) were instrumented to measure ship motions. As briefly discussed in the introduction, the focus for the PAQ itself is on the relationships between fatigue and motion sickness symptoms, and associated or consequential problems with task performance. Thus, the types and severity of problems, and

correlations between them can be examined on seven ships, and the additional linkage to ship motions can be examined on two of the ships.

4.2 Environment

Figures 1 and 2 show the 6-hour variation of significant waveheight and wind speed encountered by Ship D. Waveheights (m) were observed by the ship's meteorology technician, and then scaled to significant waveheight following [9], and wind speeds (kt) are as recorded by the ship's bridge anemometers, with the effect of ship speed removed. 'Day of Trial' is defined in section 5.2.

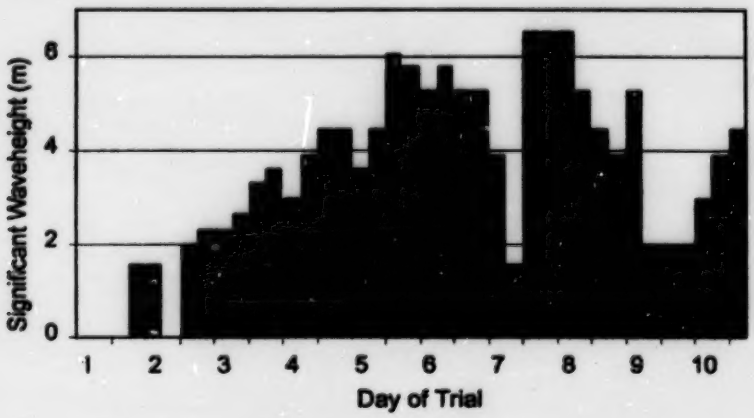

Figure 1: Significant waveheight (m), Ship D

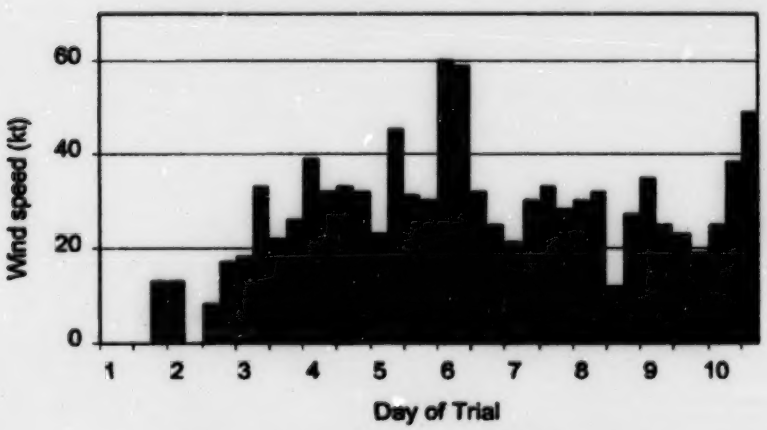

Figure 2: Average wind speed (kt), Ship D

The wave and wind conditions vary from calm to severe. A significant waveheight of 6 metres, which is reached or exceeded on two occassions, corresponds to lower NATO "Sea State 7". The highest wind speed of 60 knots corresponds to Beaufort Wind Scale 11, or storm. Since the ships in STANAVFORLANT were often spread over a wide area, with some ships operating in shelter of land while others were in the open ocean, there is no direct correspondence between waves and

winds experienced on an individual ship at any given time, nor between waves and wind experienced on different ships, at the same time.

5.0 PAQ responses

A total of 1707 PAQ booklets were distributed, and 1026 were returned, representing 60 % of the personnel on the seven ships. Table 2 summarizes the percent of PAQ booklets returned and the number of PAQ completions from each ship. One PAQ completion is defined as a matched-pair of the Symptoms and Performance sections which is filled out by a subject.

Table 2: Returned PAQ booklets and number of PAQ completions

Ship ID =>	A	B	C	D	E	F	G
Booklets returned (%)	45.6	30.5	71.6	89.6	83.9	36.7	45.5
PAQ completions	1221	620	2829	2722	5870	1454	1795

The number of PAQ completions varies between ships according to both the number of booklets returned, and the number of completions per day. For example, Ship E does not have more than twice the complement as Ship D, but almost all subjects on ship E completed the PAQ twice per day, while those on Ship D had a lower per-day completion rate. Annex F tabulates the number of PAQ completions each day, and also shows 'null' responses, which are described in the next section.

The resulting PAQ database contains 16,511 completions of the Symptoms and Performance sections, in addition to other descriptive and comment fields. The daily distribution of PAQ completions is examined later in this section, and the percent of booklets returned is used later as a measure of reliability.

5.1 Scoring subject input

All of the PAQ data fields (i.e. places for the subject to enter responses) are either checkboxes or underlined sections for input of text, except for the 'seasickness scale', where the subject circles or marks their response.

Most of the PAQ parameters are scored on a four-point scale, using checkboxes to select responses from zero through three; corresponding to none through severe. The seasickness scale is scored on an eleven-point scale (0 through 10). In all cases, the higher score corresponds to a more severe problem, and a score of zero indicates the described condition or problem is reported as 'not present'. Most other parameters are scored on a yes/no basis, where no is scored as zero, and yes is scored as one.

Every case where a subject did not provide input for a PAQ parameter is defined as a null response, and scored as '-1' in the PAQ database. These null responses are tabulated in Annex F, and are incorporated in the reliability assessment, described later.

5.2 Half-day time base and 'Day of Trial'

The PAQ responses are sorted on fixed 12-hour intervals, giving first-half days (00:01 to 12:00 hours) and second-half days (12:01 to 24:00). All times in the PAQ database are GMT, which was also local time for the trial. On all time axes in subsequent figures, the integer part of the day number (e.g. day 3.0) corresponds to the first half-day, and the 'half' part (e.g. day 3.5) is the second half-day. This approach was taken to account for the most common watch rotation system, where crew members generally stand watch twice per day, once in the first half, and again in the second half.

The problem severity and correlation results reported in References [1] and [2] are based on PAQ data for days 1.5 through 10.5, whereas the actual trial period extended from day 0.0 through 11.5 (12 days at sea). Figure 3 shows the daily response rates over the entire trial period, for all ships. For each ship, the number of subjects completing the PAQ during each 12-hour interval is plotted, expressed as the percent of the number of subjects returning PAQs from that ship. The data for days 0.0 through 1.0 are excluded for two reasons: first, the ships did not all depart harbour on the same day; and, second, PAQ responses during the beginning of the trial were relatively low, as many people were involved in preparations for the coming exercises. Similarly, the last day of data is excluded for two reasons: first, the response rates fell as the harbour approached, and second, crew 'mood' changed fairly dramatically on the last day, which was spent steaming from the exercise area to port. Excluding the first days means that the 'onset' of motion sickness cannot be examined, but this is a moot point, as the crews had significant habituation [10] from previous weeks at sea.

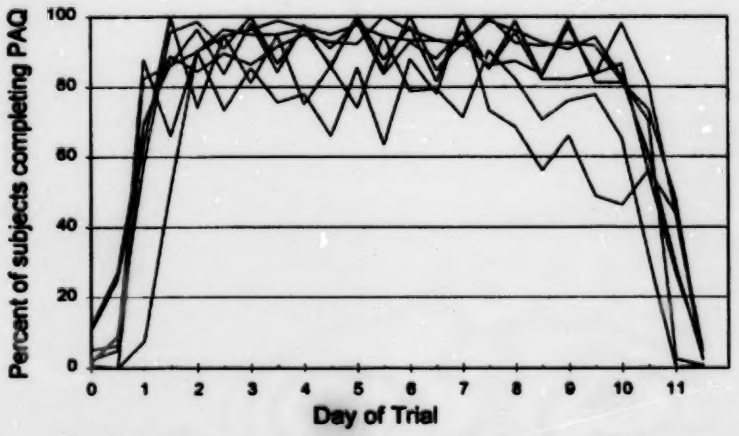

Figure 3: Daily response rate for each ship (percent of PAQ returns).

5.3 Times of PAQ completion

Table 3 summarizes the percent of PAQ completions that were done in in the first-half day vs. second-half day, and for day work vs. night work. The first- and second-half days are defined above (i.e. 00:01 to 12:00, and 12:01 to 24:00). Day work is from 06:01 to 18:00, and night work

is from 18:01 to 06:00. The last two columns in Table 3 define the average and Standard Deviation across all ships.

Table 3: Times of day for PAQ completions

Ship ID =>	A	B	C	D	E	F	G	Ave.	S.D.
first half-day (%)	51.8	54.0	49.2	47.6	50.9	50.3	46.7	50.1	2.5
second half-day (%)	48.2	46.0	50.8	52.4	49.1	49.7	53.3	49.9	-
day work (%)	62.3	67.4	60.9	68.6	65.8	53.2	57.0	62.2	5.6
night work (%)	37.7	32.6	39.1	31.4	34.2	46.8	43.0	37.8	-

The actual distribution of PAQ completions over the time of day varies between the ships, as shown in Figures 4 and 5, for Ships D and F. Each figure shows the cumulative distribution for a hypothetical even-distribution of responses (straight line) and actual PAQ completion times (data points),. The number of PAQ completions on each ship, N, is defined in the figure titles.

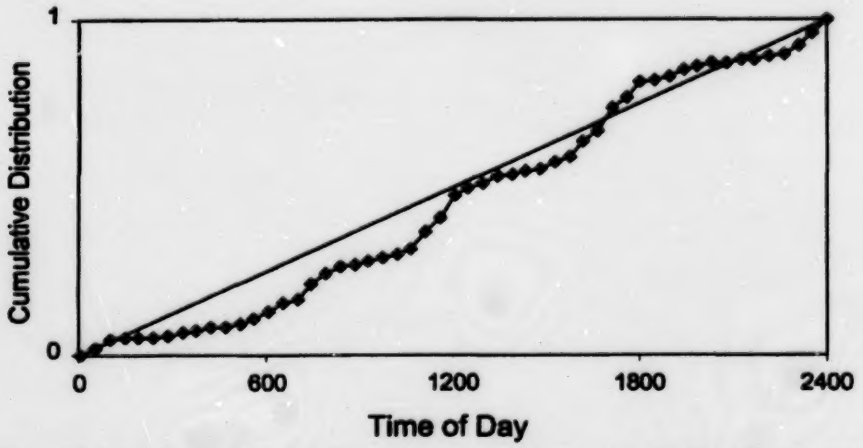

Figure 4: PAQ completion times, cumulative distribution for Ship D (N = 2722)

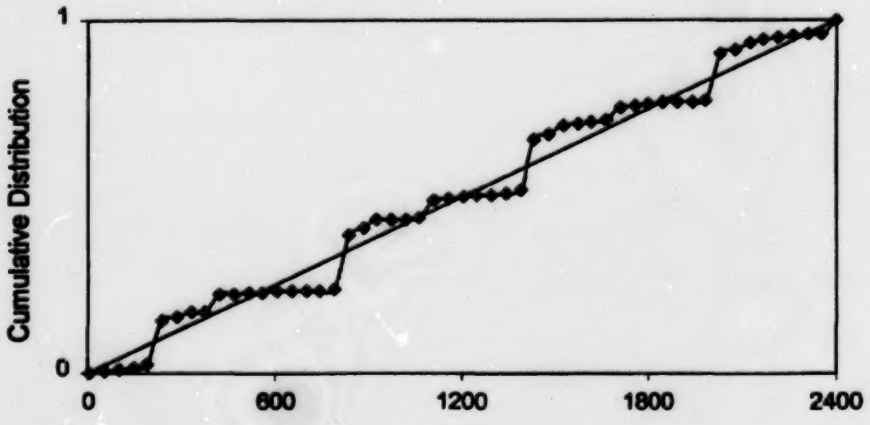

Figure 5: PAQ completion times, cumulative distribution for Ship F (N = 1454)

Ship D, in Figure 4, has a relatively smooth variation of completion time, while Ship F, in Figure 5, shows a pronounced step-function pattern, which corresponds to the changing of watches. Ship B is very similar to D, Ship E is very similar to Ship F, and Ships A and G are in between the two cases. While there are characteristic differences between the distribution of responses, all cases provide a relatively even balance over time.

5.3 PAQ database

Hand written PAQ responses were entered into a computer 'flat' database (i.e. non-relational). After entering all data for a particular ship, a random selection of ten percent of the PAQ booklets from that ship were completely re-entered. Any discrepancies between the first and second data entries were highlighted and resolved on the spot. Only one ship had a difference between the two data entries greater than 0.1 percent. An additonal 10% of PAQs were re-entered for this ship, with no further discrepancies.

For each ship, three files were generated: one for Personal Information data; one for all Symptoms and Performance completions; and, one for General Comments. The three files are linked by a common definition of subject number, which were assigned in the order in which the PAQ booklets were entered into the computer (an effectively random process, as the PAQ booklets were shuffled).

These files, which comprise the entire PAQ database, will not be released to third parties in their original format, as they contain sufficient information to identify many specific individuals. Even though subjects' names are not recorded anywhere in the database, some combinations of rank and trade (e.g. LCdr / Executive Officer), and of tasks (e.g. Officer of Watch, flying helicopter) provide sufficient information to identify an individual. In other cases, the sum of information in the files (e.g. rank, trade, location of berth, tasks) can easily narrow any particular entry in the original PAQ down to one or a few individuals.

6.0 Reliability of responses

Three indirect measures of reliability are used to assess relative reliability of responses:

(1) the percent of crew returning a PAQ booklet (i.e. participation rate);
(2) the percent of PAQ completions with a valid date/time field; and,
(3) the percent of single-quantity checkboxes completed.

As before, a 'PAQ completion' is defined as the once-per-watch recording of data on the Symptoms and Performance sections. Some PAQ completions had either blank or illegible date/time fields, and so present a problem for time-based analaysis. It is possible to insert approximate dates and times, but the simplest case is to exclude them. The total number of 16,511 PAQ completions defined earlier does not include completions with an invalid date/time field.

The term 'single-quantity checkbox' used for the third measure refers to a PAQ checkbox associated with a specific response or description, such as "sleepy", "memory", and "noise". This excludes text fields, such as "Location", "Comments" and all occurrences of "other". In general,

if the subject had no information to enter in an "other" field, then the associated checkbox was empty. This quantity is the complement of the null response described earlier: percent completed = 100 - percent nulls. Annex F summarizes null responses.

Table 4 shows the three measures of reliability: (1) crew participation rate; (2) percent of PAQ completions with valid date and time fields; and, (3) percent of single-quantity checkbox completions. A 'correct completion' rate is defined as the product of (2) and (3), expressed as percent, and an overall 'Figure of Merit' (FOM) is defined as the product of (1), (2) and (3), normalized with respect to one. The reliability of 'correct completion' and FOM are presented in the lower part of the table as multiples of the all-ship standard deviations (SD). Ships within one-half SD of the average have medium reliability (acceptable), ships below one-half SD have low reliability (unacceptable), and ships above 0.5 SD have high reliability. These threshold values are somewhat arbitrary, but inspection of the associated participation and completion rates suggests that they are reasonable.

Table 4: Reliability Assessment

		A	B	C	D	E	F	G	ave.
1	Crew participation (PAQ returns) (%)	45.6	30.5	71.6	89.6	83.9	36.7	45.5	57.6
2	Valid date/time record (%)	95.2	90.6	93.1	95.3	98.8	97.3	97.3	95.4
3	Checkbox completion (%)	97.9	98.6	98.6	98.7	98.7	99.6	98.7	98.7
	Correct completion rate = (2)*(3) (%)	93.3	89.3	91.8	94.1	97.5	96.8	96.0	94.1
	F.O.M. = (1)*(2)*(3) / 100^3	0.43	0.27	0.66	0.84	0.82	0.36	0.44	0.54
	SD for 'correct completion'	-0.3	-1.6	-0.8	0.0	1.2	0.9	0.7	
	SD for FOM	-0.5	-1.2	0.5	1.3	1.2	-0.8	-0.5	
	Reliability for 'correct completion'	med	low	low	med	high	high	high	
	Reliability for FOM	med	low	med	high	high	low	med.	
	Overall reliability	med	low	med	high	high	med	high	

Clearly, Ship B has the lowest reliability. Ships D, E and G have relatively high reliability, and ships A, C and F are somewhere in between. One of the main considerations in evaluating the effects of crew participation is whether an arbitrary limit can be assigned, above which the sample is representative of the general population, and below which it is not. Incorporating crew participation in the F.O.M. can have a large effect, especially for Ship F.

The all-ships average for single-quantity checkbox completion of 98.7 percent is very high. This indicates that all subjects were very consistent at completing the 'targeted' symptoms and performance descriptors, and suggests that they took the exercise seriously. This is further substantiated by an informal analysis of comments; not all were directly related to the intent of the PAQ, but almost all were obviously written with the intent of communicating real problems and concerns to naval authorities. The all-ship average completion rate for text and 'other' fields' is much lower, at 56.1 percent, and the completion rate for the last two items in the 'Other problems' list (lighting and temperature) was a dismal 24.2 percent. The author acknowledges the complex and unsuccessful design of these two, multi-quantity checkboxes.

7.0 Personnel demographics

Demographic data from the Personal Information section are summarized in Table 5. Only four of the 1026 returned PAQs were completed by female subjects.

Table 5: Personnel demographics

	A	B	C	D	E	F	G	ave.
Average age (years)	32.5	30.1	27.8	31.7	23.7	24.8	28.7	28.5
Average sea time (years)	6.5	4.7	5.7	5.5	2.5	2.6	5.7	4.7
Average time in this ship class (years)	1.5	2.4	2.6	2.2	2.2	2.4	2.8	2.3
Percent answering "Yes" to: "Ever use seasickness medicine" ?	12.3	41.0	15.7	36.1	16.6	11.0	27.0	22.8

Figure 6 shows the average age of subjects and a complement/displacement ratio vs. the year of commissioning for the first-of-class of each ship type. The complement/displacement ratio is defined as 100 N / Δ, where N is the complement and Δ is the full load displacement in tonnes. Two trends are clear; average crew age is higher on the newer ships, and complement size (modified to reflect ship size) is decreasing. The latter is well understood; however, the former has not been widely discussed. This is likely a direct reflection of the higher levels of knowledge, education and training which are required to operate the increasingly complex systems that enable the reduction in complement.

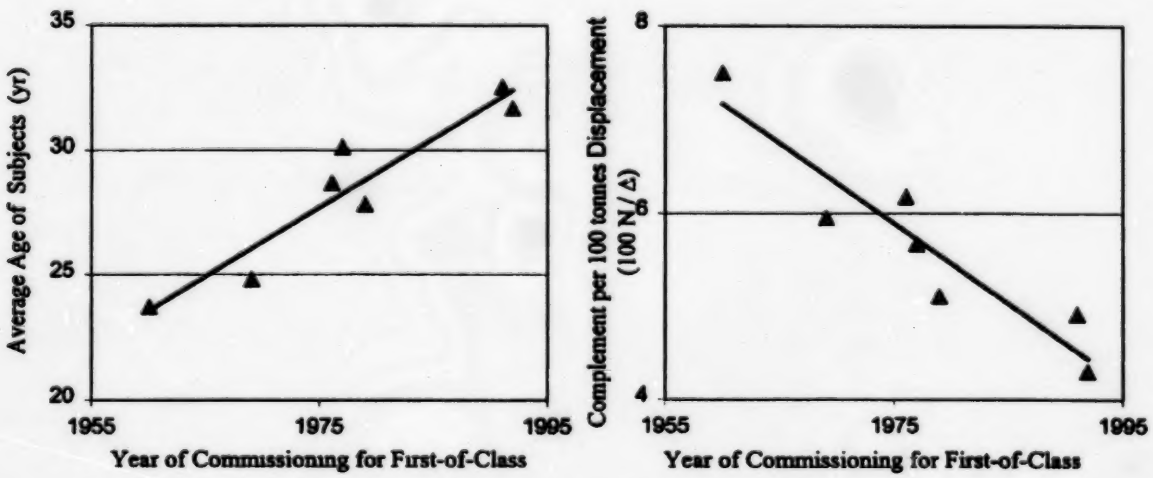

Figure 6: Average age and complement/displacement ratio

8.0 Comments and Recommendations

The author does not recommend a second PAQ deployment on STANAVFORLANT in the near future, as considerably more work must be done before fully understanding the existing database.

Although the PAQ was designed specifically for the STANAVFORLANT deployment, it is hoped that it may find more general application in the future. The continual pressure to increase the number of parameters in the PAQ during its development clearly indicates that the current form is not sufficiently general for all uses; however, by including the PAQ itself, or by incorporating its parameters in larger and more detailed questionnaires, the existing PAQ database may be incrementally expanded in the future. It would be especially interesting to compare existing results with PAQ deployments on new ship classes, as they are introduced in the future.

8.1 PAQ design

Overall, the intent to design the PAQ so that it is easy and fast to complete was accomplished; however, a few practical problems were encountered with the current design. These problems did not have a negative impact on the success of the trial, nor on the utility of the results, but some improvements are possible. A number of comments and recommendations for change are presented below.

Personal Information section

- "Do you ever take seasickness medicine ?" should be modified. The original PAQ [5] question "Do you take medication against sea sickness ?" was judged too unspecific during PAQ development. This question should either revert to the original form, or should be a variant of "Do you usually take seasickness medicine in rough weather ?".

Symptoms and Performance sections

- The "Time" field in the Symptoms section should be replaced by three time fields: "Time now", "Watch start", and "Watch end", as in Reference [5]. These changes will explicitly define the duration of watch and number of watches per day, for each subject. These parameters are not required for the current fixed-time problem severity and correlation analysis [1,2], but would be useful for a 'time on task' analysis approach.

- The "Location" field in the Symptoms section should be modified to read either "Location for watch" or "Duty station". A small proportion of subjects did not understand the intended meaning of this question; on Ship D, approximately 5% of subjects responded "at sea".

- The "air quality (bad smells)" field in the Other problems category should be modified to read either "air quality" or "air quality (stale, bad smells)". There is no evidence that the general intent of this question (i.e. any problems with air quality) was misunderstood, but the single example "bad smells" may cause problems.

- As discussed in Section 6.0, the "lighting (bright, dark)" and "temperature (hot, cold)" fields in the Other problems category should be separated into four parameters; "lighting too dark", "lighting too bright", "temperature too cold", and "temperature too hot".

8.2 Deployment

This STANAVFORLANT exercise was the ideal scenario for deploying the PAQ. All ships were involved in multi-theatre (air, surface and sub-surface) combat exercises against real assets, and the season and location provided a high probability of encountering high seas. When the fleet was first contacted to arrange the deployment, the initial response was that the fleet would be extremely busy, and perhaps the deployment could be deferred until a later date, during a southern North Atlantic transit, in May. A review of wave statistics [11] showed that the probability of encountering significant wave heights greater than 4 metres fell from over 50 percent for the northern deployment, to below 10 percent for the alternative. This information was critical in obtaining the desired deployment.

Overall, the STANAVFORLANT deployment was a great success. The general approach of distributing PAQ booklets, with subjects' names on a removable cover, worked well; however, it would be desirable to increase crew participation rates to above 60 percent on all ships. Two conditions are key for obtaining high participation rates: convincing all personnel that the exercise is worthwhile; and, support of the ships' Commanding Officers. It appears that the former was fairly well met by the simple General Information section in the PAQ booklet. In the author's opinion, the response rates were generally proportional to the perceived support of individual Commanding Officers. The type of support desired was simple to provide, consisting of a brief description of the project and statement of support by the Commanding or Executive Officer at the start of the deployment, followed by periodic reminders in written and broadcast briefings during the trial.

A wide variety of lessons were learned in planning and performing this PAQ deployment; however, only the principal ones are discussed here. It is recommended that the original project description and resulting permission from senior staff (in this case, SACLANT) should be distributed to the ships, early in the process. It is vital that each ship has a point of contact who is responsible for distributing and collecting the questionnaires, as was the case on this trial, and it is recommended that this person should be the ship's senior medical staff. When this person is not an officer, then the designated contact should be an officer, who can delegate the logistical responsibilities through the medical department. In addition to having a responsible military contact on each ship, it is highly recommended that each ship should also have a scientific representative to answer day-to-day questions from the crew, and to observe and record general ship operations.

Finally, a great deal of preparation is required before initiating the actual deployment. The time between initial contact with STANAVFORLANT and the deployment was only about three months, and there was less than one month between final confirmation of fleet availability and embarkation.

9.0 Conclusion

The NATO Fatigue, Seasickness and Task Performance Assessment Questionnaire (PAQ) was deployed on the Standing Naval Forces Atlantic (STANAVFORLANT) fleet in 1997, and a large database of responses has been developed. This Technical Memorandum documents the development and deployment of the PAQ, in the five languages used for the STANAVFORLANT deployment. The methods used to score PAQ responses were defined, and a reliability assessment of the responses from each ship was presented. Fleet personnel demographics were discussed, and comments and recommendations for improving results on potential future questionnaire deployments were made. A companion Technical Memorandum presents data on the types and severity of reported problems, and examines correlations between ship motions, fatigue, seasickness and task performance.

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Notation

ABCD	American, British, Canadian, and Dutch
Avg.	average
DERA	Defence Evaluation and Research Agency, UK
DREA	Defence Research Establishment Atlantic, Canada
FOM	Figure of Merit (used in PAQ reliability analysis)
IEG/6	International Exchange Group 6 on Ship Design, of NNAG
N	number of responses
NATO	North Atlantic Treaty Organization
NG/6	Naval Group 6 on Ship Design, of NNAG (was IEG/6)
NNAG	NATO Naval Armaments Group
PAQ	Performance Assessment Questionnaire
SACLANT	Supreme Allied Commander, Atlantic, of NATO
SD	standard deviation
SG/5	Sub-group 5 on Seakeeping, of IEG/6
STANAVFORLANT	Standing Naval Forces Atlantic (NATO fleet)
TNO	Netherlands Organisation for Applied Scientific Research
Δ	full load displacement (tonnes)

Annex A: Dutch Language PAQ

Table A.1: Cover page - Dutch Language PAQ

NATO - OTAN

STANAVFORLANT - 1997

Vermoeidheid, zeeziekte en prestatie vragenlijst

Naam: _____

(verwijder dit schutblad voordat U de vragenlijst weer inlevert)

Table A.2: General Information page (guidance) - Dutch Language PAQ

Algemene Informatie

Zet uw naam op de voorkant van het schutblad. Dit is alleen om te voorkomen dat uw vragenlijst bij verlies zou kwijtraken. U mag het schutblad verwijderen voordat U de vragenlijst aan het eind van het onderzoek weer inlevert.

U wordt verzocht met behulp van deze vragenlijst aan te geven wat uw persoonlijke ervaring is met vermoeidheid, met zeeziekte, en mogelijk met andere problemen die worden veroorzaakt door scheepsbewegingen. Weliswaar zijn voor zeevarenden die problemen wel algemeen bekend maar hun effecten op de uitvoering van werkzaamheden zijn niet eerder onderzocht. Deze vragenlijst is bedoeld om inzichten te verwerven die kunnen leiden tot een nieuwe aanpak bij operationele ondersteuning op zee. Ook kunnen ze scheepsbouwers helpen bij het ontwerpen van schepen waarbij minder problemen optreden.

Op de eerste pagina worden enkele persoonlijke gegevens gevraagd. De rest van het boekje bevat **symptoombladzijden** en **prestatiebladzijden**. U wordt verzocht die op gezette tijden in te vullen. Het is van groot belang dat U elke keer bij het invullen alle vragen beantwoordt op beide bladzijden, zelfs al bent U erg moe of voelt U zich ziek. Als U een boekje verliest, vraag dan direct om een nieuw exemplaar bij de contactpersoon die voor de vragenlijsten verantwoordelijk is.

De ingevulde vragenlijsten zullen alleen worden gebruikt voor wetenschappelijk onderzoek. Alle resultaten worden strikt vertrouwelijk behandeld.

U kunt opmerkingen kwijt onderaan op elke prestatiebladzijde en ook op de laatste pagina van de vragenlijst.

Begin dan nu met het invullen van uw naam op de bladzijde met persoonlijke gegevens. U krijgt neeg the horen wanneer U de eerste twee bladzijden (één symptoombladzijde en één prestatiebladzijde) moet invullen.

Dank voor uw medewerking aan dit onderzoek.

Table A.3: Personal Information page (questions) - Dutch Language PAQ

Persoonlijke Informatie

Schip _____

Rang _____

Functie _____

Leeftijd _____ Sexe..... Man ☐ Vrouw ☐

Locatie van uw kooi of van de hut waar U slaapt ...

_____

Hoeveel tijd heeft U ongeveer op zee doorgebracht ?
(grote tussenliggende perioden aan
wal niet meerekenen) ..... (jaren) _____

Hoeveel vaar-ervaring heeft U met
schepen van deze klasse? ..... (jaren) _____

Hoe lang heeft U, voorafgaand aan dit deel
van de oefening, aan wal gezeten of heeft U
met uw schip aan de haven gelegen ?.. (dagen) _____

Neemt U ooit middelen tegen zeeziekte? ..... ja ☐ nee ☐

Zo ja, • welk middel neemt U meestal ?...

_____

• Welke dosis neemt U meestal ?...

_____

Table A.4: Symptoms page (questions) - Dutch Language PAQ

Symptomen

Datum _____ Tijd _____

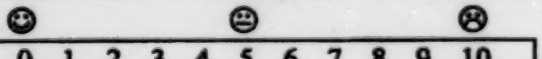
Locatie _____

Taken _____

Slaapproblemen voorafgaand aan deze wacht 0 = geen, 3 = ernstig:	0	1	2	3
Slecht geslapen	☐	☐	☐	☐
Kort geslapen	☐	☐	☐	☐
Slaapproblemen veroorzaakt door:				
Scheepsbewegingen	☐	☐	☐	☐
zeeziekte	☐	☐	☐	☐
andere oorzaak: _____	☐	☐	☐	☐

Symptomen die tijdens deze wacht werden ervaren 0 = geen, 3 = ernstig:	0	1	2	3
mentaal moe	☐	☐	☐	☐
lichamelijk moe	☐	☐	☐	☐
slaperig	☐	☐	☐	☐
hoofdpijn	☐	☐	☐	☐
apathie (onverschilligheid)	☐	☐	☐	☐
gespannen/angstig	☐	☐	☐	☐
overgeven of kokhalzen	☐	☐	☐	☐
misselijk (nog niet overgeven)	☐	☐	☐	☐
naar gevoel in de maag	☐	☐	☐	☐
ander symptoom: _____	☐	☐	☐	☐

Hoe zeeziek bent U? 0 = me goed, 10 = me ellendig



Heeft U een middel tegen zeeziekte genomen? ja ☐ nee ☐

Heeft U overgegeven vóór / tijdens deze wacht ? ja ☐ nee ☐

zo ja, wanneer ongeveer? _____

hoe voelde U zich daarna? beter ☐ hetzelfde ☐ slechter ☐

Table A.5: Performance page (questions) - Dutch Language PAQ

Prestaties

Problemen tijdens het uitvoeren van uw werk 0 = geen, 3 = ernstig:	0	1	2	3
het nemen van beslissingen	☐	☐	☐	☐
concentratie / aandacht	☐	☐	☐	☐
onthouden	☐	☐	☐	☐
eenvoudige taken (optellen, spellen).	☐	☐	☐	☐
lichaamsbewegingen (evenwicht houden)	☐	☐	☐	☐
het verplaatsen of dragen van dingen .	☐	☐	☐	☐
handcoördinatie.....	☐	☐	☐	☐
gezichtsvermogen	☐	☐	☐	☐
iets anders: _____	☐	☐	☐	☐

Problemen met het voltooien van uw werkzaamheden tijdens deze wacht

maakte meer vergissingen dan normaal .. ja ☐ nee ☐
namen meer tijd in beslag dan normaal... ja ☐ nee ☐
kreeg taken niet af in de beschikbare tijd ja ☐ nee ☐
moest ophouden met taken ..... ja ☐ nee ☐
neet allowed to attempt tasks ..... ja ☐ nee ☐
andere: _____ ja ☐ nee ☐

Andere problemen tijdens deze wacht 0 = geen, 3 = ernstig:	0	1	2	3
verkoudheid, griep of andere ziekte	☐	☐	☐	☐
slechte luchtkwaliteit (bedompt, etc).....	☐	☐	☐	☐
lawaai	☐	☐	☐	☐
trillingen	☐	☐	☐	☐
verlichting(helder ☐, donker ☐)	☐	☐	☐	☐
temperatuur (heet ☐, koud ☐)	☐	☐	☐	☐
ander probleem: _____	☐	☐	☐	☐

Opmerkingen _____

_____

Table A.6: General Comments - Dutch Language PAQ

Algemene opmerkingen

Algemene opmerkingen, commentaar of suggesties kunt U hier noteren.

Verdere informatie is te verkrijgen op het volgende adres:

NATO PAQ
Defence Research Establishment Atlantic
PO Box 1012, 9 Grove Street
Dartmouth NS, Canada B2Y 3Z7

Annex B: English Language PAQ

Table B.1: Cover page - English Language PAQ

NATO - OTAN

STANAVFORLANT - 1997

Fatigue and Seasickness
Performance Assessment Questionnaire

Name: _____

(remove this cover before returning the questionnaire)

Table B.2: General Information page (guidance) - English Language PAQ

General Information

Please put your name on the front cover. This is only to make sure that you do not lose the questionnaire. You can remove the cover before you return the completed questionnaire at the end of this trial.

This NATO questionnaire asks you to describe your personal experience with fatigue, seasickness, and other problems caused by ship motions. These problems are familiar to all sea-going personnel, but their effects on task performance are not well understood. This questionnaire will help develop new approaches for operational guidance at sea and new methods for ship and system design.

The first page asks for some **Personal Information**. The rest of the booklet contains the **Symptoms** and **Performance** pages that you will be asked to complete on a regular schedule. Each time you complete the questionnaire, please answer all questions on both pages, even if you feel very tired or sick. If you lose your booklet or run out of pages, please get a new one from the questionnaire point of contact.

The completed questionnaires will be used for research purposes only. All results will be kept confidential.

You may enter comments and suggestions on each performance page, and also on the last page of the questionnaire.

Now, please put your name on the cover and complete the Personal Information page. You will be advised when to begin the first 2-page symptoms and performance section.

Thank you for participating in this project.

Table B.3: Personal Information page (questions) - English Language PAQ

Personal Information

Ship _____

Rank _____

Trade _____

Age _____ Sex ..... Male ☐ Female ☐

Location of berth or sleeping compartment ...

_____

How much sea time do you have,
not counting time in refit ? ..... (years) _____

How long have you been in
this class of ship ? ..... (years) _____

How long were you along side or
ashore before this part of the
exercise started ? ..... (days) _____

Do you ever take seasickness medicine ? ..... yes ☐ no ☐

if yes, • what kind do you usually take ? ...

_____

• what dosage do you usually take ? ...

_____

Table B.4: Symptoms page (questions) - English Language PAQ

Symptoms

Date _____ Time_____

Location _____

Tasks_____

Sleeping problems before this watch

0 = none, 3 = severe:	0	1	2	3
quality of sleep was poor	☐	☐	☐	☐
amount of time sleeping was short	☐	☐	☐	☐
sleep problems caused by:				
ship motions (bouncing around)	☐	☐	☐	☐
seasickness	☐	☐	☐	☐
other: _____	☐	☐	☐	☐

Symptoms experienced during this watch

0 = none, 3 = severe:	0	1	2	3
mental fatigue	☐	☐	☐	☐
physical fatigue	☐	☐	☐	☐
sleepy	☐	☐	☐	☐
headache	☐	☐	☐	☐
apathy (just don't care)	☐	☐	☐	☐
tension / anxiety	☐	☐	☐	☐
vomiting or retching	☐	☐	☐	☐
nausea (not vomiting ... yet)	☐	☐	☐	☐
stomach awareness	☐	☐	☐	☐
other: _____	☐	☐	☐	☐

How seasick are you ? 0 = feel fine, 10 = feel awful

☺ ☹

0 1 2 3 4 5 6 7 8 9 10

Are you taking seasickness medicine ? yes ☐ no ☐

Did you vomit before/during this watch ? yes ☐ no ☐

if yes, at about what time ? _____

how did you feel after ? better ☐ same ☐ worse ☐

Table B.5: Performance page (questions) - English Language PAQ

Performance

Task performance problems during this watch 0 = none, 3 = severe:	0	1	2	3
making decisions	☐	☐	☐	☐
concentration / attention	☐	☐	☐	☐
memory	☐	☐	☐	☐
simple tasks (adding, spelling)	☐	☐	☐	☐
body motions (balance)	☐	☐	☐	☐
carrying or moving things	☐	☐	☐	☐
hand coordination	☐	☐	☐	☐
vision	☐	☐	☐	☐
other: _____	☐	☐	☐	☐

Task completion problems during this watch

made more mistakes than usual ..... yes ☐ no ☐
tasks took longer than usual ..... yes ☐ no ☐
tasks not completed in time available ... yes ☐ no ☐
had to abandon tasks ..... yes ☐ no ☐
not allowed to attempt tasks ..... yes ☐ no ☐
other: _____ yes ☐ no ☐

Other problems during this watch 0 = none, 3 = severe:	0	1	2	3
cold, flu or other illness	☐	☐	☐	☐
air quality (bad smells)	☐	☐	☐	☐
noise	☐	☐	☐	☐
vibration	☐	☐	☐	☐
lighting (bright ☐, dark ☐)	☐	☐	☐	☐
temperature (hot ☐, cold ☐)	☐	☐	☐	☐
other: _____	☐	☐	☐	☐

Comments _____

_____

Table B.6: General Comments - English Language PAQ

General Comments

Please enter any general comments and suggestions below.

Please address any requests for additional information to:

NATO PAQ
Defence Research Establishment Atlantic
PO Box 1012, 9 Grove Street
Dartmouth NS, Canada B2Y 3Z7

Annex C: French Language PAQ

Table C.1: Cover page - French Language PAQ

NATO - OTAN

STANAVFORLANT - 1997

Questionnaire sur l'évaluation de la capacité d'accomplir certaines tâches en cas de fatigue ou de mal de mer

Nom: _____

(retirez ce feuillet avant de renvoyer le questionnaire)

Table C.2: General Information page (guidance) - French Language PAQ

Informations générales

Ecrivez, SVP, votre nom sur cette première page. Ceci étant uniquement pour être sûr que vous ne perdrez pas le questionnaire. Vous pouvez supprimer cette première page avant de retourner ce questionnaire une fois rempli à la fin de cette enquête.

Ce questionnaire de l'OTAN vous demande de décrire vos expériences personnelles avec la fatigue, le mal de mer et autres problèmes causés par les mouvements du navire. Ces problèmes sont familiers à tout personnel navigant, mais leurs effets sur la capacité d'accomplir certaines tâches ne sont pas encore très bien analysés. Ce questionnaire permettra de développer de nouvelles approches pour le guidage opérationel en mer ainsi que de nouvelles méthodes pour des plans de bateaux et leurs systèmes.

La première page concerne des informations personnelles. Le reste de la brochure contient une partie concernant les symptômes et la capacité d'accomplir les tâches, que vous devez remplir de façon régulière. Chaque fois que vous remplissez le questionnaire, répondez SVP à toutes les questions sur les deux pages, même si vous vous sentez faible ou êtes fatigué. Si vous perdez votre brochure ou avez entièrement rempli les feuillets, veuillez en demander un nouvel exemplaire au point de contact de ce questionnaire.

Les questionnaires remplis seront utilisés uniquement pour la recherche. Tous les résultats seront gardés confidentiels.

Vous pouvez donc écrire des commentaires ou suggestions sur chaque feuillet à remplir, y compris sur la dernière page.

Ecrivez votre nom maintenant sur cette première page SVP et complétez la page des questions personnelles. Vous serez informés quand commencer avec la première partie longue de deux pages sur les symptômes et la capacité d'accomplir les tâches.

Merci de participer à ce projet.

Table C.3: Personal Information page (questions) - French Language PAQ

Informations personnelles

Vaisseau _____

Rang _____

Etat _____

Age _____ Sexe ..... masculin ☐ féminin ☐

Situation de la couchette ou du dortoir...

_____

Combien de temps avez-vous passé en mer, sans compter les jours où le bateau était au radoub? (en années) __

Depuis combien de temps êtes-vous sur cette sorte de bateaux? ..... (en années) ___

Depuis combien de temps aviez-vous accosté ou êtiez-vous à terre avant le commencement de l'exercice? ..... (en jours) ___

Avez-vous déjà pris des médicaments contre le mal de mer? ..... oui ☐ non ☐

si oui, • quelle sorte prenez-vous habituellement ?

_____

• quel dosage prenez-vous habituellement ?

_____

Table C.4: Symptoms page (questions) - French Language PAQ

Symptômes

Date _____ Heure _____

Endroit _____

Tâches _____

Problèmes d'insomnie avant de prendre le quart

0 = aucun, 3 = graves:	0	1	2	3
médiocre qualité de sommeil	☐	☐	☐	☐
sommeil de courte durée	☐	☐	☐	☐
les causes de l'insomnie:				
les mouvements du bateau (de bas en haut)	☐	☐	☐	☐
mal de mer	☐	☐	☐	☐
autres: _____	☐	☐	☐	☐

Symptômes observés pendant le quart

0 = aucun, 3 = graves:	0	1	2	3
fatigue mentale	☐	☐	☐	☐
fatigue physicale	☐	☐	☐	☐
somnolence	☐	☐	☐	☐
maux de tête	☐	☐	☐	☐
apathie (indifférence)	☐	☐	☐	☐
tension / anxiété	☐	☐	☐	☐
vomissement ou haut-le-coeur	☐	☐	☐	☐
nausée (envie de vomir)	☐	☐	☐	☐
impression d'avoir l'estomac barbouillé...	☐	☐	☐	☐
autres: _____	☐	☐	☐	☐

Souffrez-vous du mal de mer?

0 = pas du tout, 10 = énormément

☺ 😐 ☹

0 1 2 3 4 5 6 7 8 9 10

Avez-vous pris des médicaments contre le mal de mer?..... oui ☐ non ☐

Avez-vous vomi avant / pendant votre quart? oui ☐ non ☐

si oui, quand approximativement ? _____

comment vous sentiez-vous après? mieux ☐ pareil ☐ pire ☐

Table C.5: Performance page (questions) - French Language PAQ

Accomplissement des tâches

Problèmes éprouvés pour accomplir les tâches pendant le quart: 0 = aucun, 3 = graves:	0	1	2	3
prendre des décisions	☐	☐	☐	☐
concentration / attention	☐	☐	☐	☐
mémoire.....	☐	☐	☐	☐
tâches très simples (addition, épeler)	☐	☐	☐	☐
mouvements du corps (équilibre)	☐	☐	☐	☐
porter et déplacer des objets	☐	☐	☐	☐
coordination des mains	☐	☐	☐	☐
vision	☐	☐	☐	☐
autres: _____	☐	☐	☐	☐

Problèmes pour finir les tâches pendant le quart:

vous avez fait plus de fautes qu'à l'ordinaire... oui ☐ non ☐
vous ont pris plus de temps que d'habitude ..... oui ☐ non ☐
les tâches n'étaient pas terminées à la
fin du temps disponible ..... oui ☐ non ☐
vous avez dû abandonner vos tâches ..... oui ☐ non ☐
vous n'aviez pas l'autorisation
de commencer vos tâches ..... oui ☐ non ☐
autres: _____ oui ☐ non ☐

Autres problèmes pendant le quart 0 = aucun, 3 = graves:	0	1	2	3
rhume, grippe et autres maladies	☐	☐	☐	☐
qualité de l'air (mauvaises odeurs) ..	☐	☐	☐	☐
bruit.....	☐	☐	☐	☐
vibration	☐	☐	☐	☐
éclairage (vif ☐, obscur ☐)	☐	☐	☐	☐
température(chaud ☐, froid ☐)	☐	☐	☐	☐
autres: _____	☐	☐	☐	☐

Remarques_____

_____

Table C.6: General Comments - French Language PAQ

Commentaires généraux

Veuillez écrire tout commentaire général ou suggestion particulière ci-dessous.

Veuillez adresser toute demande de renseignements complémentaires à:

NATO PAQ
Defence Research Establishment Atlantic
PO Box 1012, 9 Grove Street
Dartmouth NS, Canada B2Y 3Z7

Annex D: German Language PAQ

Table D.1: Cover page - German Language PAQ

NATO - OTAN

STANAVFORLANT - 1997

Fragebogen zur Festellung der Leistung bei Müdigkeit und Seekrankheit

Name: _____

(Bevor Sie den Fragebogen zurücksenden, entfernen Sie bitte das erste Blatt)

Table D.2: General Information page (guidance) - German Language PAQ

Allgemeine Informationen

Schreiben Sie bitte Ihren Namen auf das erste Blatt. Dies ist nur, um sicher zu sein, daß Sie den Fragebogen nicht verlieren. Sie können das erste Blatt entfernen, bevor Sie diesen ausgefüllten Fragebogen am Ende dieser Untersuchung zurücksenden.

Dieser NATO Fragebogen bittet Sie, Ihre persönliche Erfahrung mit Müdigkeit. Seekrankheit und anderen durch Schiffsbewegung verursachten Probleme zu beschreiben. Diese Probleme sind jedem Mitglied der Schiffsbesatzung bekannt, aber ihre Wirkungen auf Arbeitsleistung sind wenig erforscht. Dieser Fragebogen soll dabei helfen, neue Möglichkeiten in Bezug auf Schiffslenkung auf See und neue Methoden für den Entwurf von Schiffen und Schiffssysteme zu entwickeln.

Das erste Blatt fragt nach einigen persönlichen Informationen. Der Rest der Broschüre enthält einen Teil über Symptome und Leistungen, die Sie bitte regelmäßig beantworten sollen. Jedes Mal, wenn Sie den Fragebogen ausfüllen, beantworten Sie bitte alle Fragen auf beiden Seiten, auch wenn Sie sich sehr müde oder krank fühlen. Sollten Sie diese Broschüre verlieren oder vollständig ausgefüllt haben, fordern Sie eine neue Broschüre an, bei der Kontaktstelle für diesen Fragebogen.

Die ausgefüllten Fragebogen werden nur für Forschungszwecke verwendet. Alle Ergebnisse werden vertraulich behandelt.

Sie dürfen Bemerkungen und Vorschläge auf jeder Seite, auch auf dem letzten Blatt des Fragebogens machen.

Jetzt schreiben Sie bitte Ihren Namen auf das Titelblatt und füllen Sie das Blatt mit den persönlichen Fragen aus. Sie erhalten Nachricht, wann Sie mit dem ersten zweiseitenlangen Teil über Symptome und Leistungen beginnen sollen.

Vielen Dank im voraus für Ihre Teilnahme an diesem Projekt.

Table D.3: Personal Information page (questions) - German Language PAQ

Persönliche Informationen

Schiff _____

Dienstgrad _____

Handelsbranche _____

Alter _____ Geschlecht ..... männlich ☐ weiblich ☐

Lage der Koje oder des Schlafabteils...

_____

Wieviel Zeit haben Sie auf See verbracht,
Trockendock nicht mitgerechnet? ... (in Jahren) _____

Wie lange sind Sie in dieser Schiffsklasse
von Schiffen gewesen? ..... (in Jahren) _____

Wie lange waren Sie an Bord oder an Land,
bevor dieser Teil der Übung begann? (In Tagen) _____

Haben Sie jemals Medikamente gegen
Seekrankheit genommen ? ..... Ja ☐ Nein ☐
Wenn ja, • welche Sorte nehmen Sie gewöhnlich?

_____

• welche Dosis nehmen Sie gewöhnlich?

_____

Table D.4: Symptoms page (questions) - German Language PAQ

Symptomen

Datum _____ Zeit _____

Ort _____

Aufgaben _____

Probleme beim Einschlafen bevor der Wache 0 = keine, 3 = ernsthafte:	0	1	2	3
die Schlafqualität war schlecht	☐	☐	☐	☐
der Dauer des Schlafes war kurz.....	☐	☐	☐	☐
die Schlafprobleme wurden verursacht durch:				
die Schiffsbewegungen (auf und ab)	☐	☐	☐	☐
Seekrankheit.....	☐	☐	☐	☐
andere: _____	☐	☐	☐	☐

Auftretende Symptome während der Wache 0 = keine, 3 = ernsthafte:	0	1	2	3
geistige Müdigkeit.....	☐	☐	☐	☐
physische Müdigkeit	☐	☐	☐	☐
Schläfrigkeit	☐	☐	☐	☐
Kopfschmerzen.....	☐	☐	☐	☐
Apathie (alles ist egal)	☐	☐	☐	☐
Angespanntheit / Angstgefühle.....	☐	☐	☐	☐
Erbrechen oder Würgen.....	☐	☐	☐	☐
Übelkeit (kein Brechreiz)	☐	☐	☐	☐
ungutes Gefühl im Magen.....	☐	☐	☐	☐
andere: _____	☐	☐	☐	☐

Wie seekrank sind Sie?

0 = gar nicht, 10 = sehr schlimm

☺ 😐 ☹

0 1 2 3 4 5 6 7 8 9 10

Nehmen Sie Medikamente gegen Seekrankheit? Ja ☐ Nein ☐

Mußten Sie vor/nach Ihrer Wache erbrechen? Ja ☐ Nein ☐

Wenn ja, wann genau ? _____

Wie fühlten Sie sich danach? besser ☐ gleich ☐ schlechter ☐

Table D.5: Performance page (questions) - German Language PAQ

Leistung

Probleme mit der Arbeitsleistung während der Wache 0 = keine, 3 = ernsthafte:	0	1	2	3
Entscheidungen treffen	☐	☐	☐	☐
Konzentration / Aufmerksamkeit	☐	☐	☐	☐
Gedächtni	☐	☐	☐	☐
Einfache Arbeiten (Addieren, Buchstabieren).	☐	☐	☐	☐
Körperbewegung (Gleichgewicht)	☐	☐	☐	☐
Tragen oder Bewegen von Dingen	☐	☐	☐	☐
Handkoordination	☐	☐	☐	☐
Sehfähigkeit	☐	☐	☐	☐
anderea: _____	☐	☐	☐	☐

Probleme mit der Arbeitsvollendung während der Wache

Sie haben mehr Fehler als gewöhnlich gemacht ..... Ja ☐ Nein ☐
die Aufgaben nahmen mehr Zeit in Anspruch
als gewöhnlich ..... Ja ☐ Nein ☐
die Aufgaben waren nach Verstreichen der zur
Verfügung stehenden Zeit nicht beendet ..... Ja ☐ Nein ☐
Sie mußten Ihre Aufgaben verlassen ..... Ja ☐ Nein ☐
keine Erlaubnis bestimmte Aufgaben zu verrichten.. Ja ☐ Nein ☐
anderea: _____ Ja ☐ Nein ☐

Andere Probleme während der Wache 0 = keine, 3 = ernsthafte:	0	1	2	3
Schnupfen, Grippe oder andere Krankheit .	☐	☐	☐	☐
Luftqualität (übel riechend)	☐	☐	☐	☐
Lärm	☐	☐	☐	☐
Vibrationen	☐	☐	☐	☐
Beleuchtung (hell ☐, dunkel ☐)	☐	☐	☐	☐
Temperatur (heiß ☐, kalt ☐)	☐	☐	☐	☐
anderea: _____	☐	☐	☐	☐

Bemerkungen _____

_____

Table D.6: General Comments - German Language PAQ

Allgemeine Bemerkungen

Tragen Sie bitte jede allgemeine Bemerkung und jedenVorschlag unten ein.

Adressieren Sie bitte jeden Wunsch nach zusätzlichen Informationen an:
NATO PAQ
Defence Research Establishment Atlantic
PO Box 1012, 9 Grove Street
Dartmouth NS, Canada B2Y 3Z7

Annex E: Spanish Language PAQ

Table E.1: Cover page - Spanish Language PAQ

NATO - OTAN

STANAVFORLANT - 1997

Valoración de la Actuación en Condiciones de Fatiga y Mareo

Nombre: _____

(Quitar esta primera página antes de devolver el cuestionario)

Table E.2: General Information page (guidance) - Spanish Language PAQ

Información General

Favor de poner su nombre en la primera página, que se hace solamente para asegurar que no se pierda el cuestionario. Ud. puede quitar la primera página antes de devolver el cuestionario al final de la prueba.

Este cuestionario de la OTAN le pide que describa su experiencia personal con respecto a la fatiga, el mareo y otros problemas causados por los movimientos de los barcos. Estos problemas les son familiares a todos los marinos, pero con respecto a las tareas abordo no son muy bien entendidos. Este cuestionario nos ayudará a desarrollar nuevos enfoques sobre la dirección de los buques en alta mar, y además nuevos métodos para el diseño de barcos y sus sistemas.

La primera página le pide **Información Personal**. El resto de este folleto consiste en las páginas sobre la sección **Síntomas** y **Actuación**, que Ud. debe llenar a base de un horario regular. Cada vez que Ud. termine el cuestionario, favor de contestar todas las preguntas en las dos páginas, aunque Ud. se sienta muy cansado o enfermo. Si Ud. pierde el folleto, o no tiene suficientes páginas, favor de pedir un nuevo folleto al punto de control.

Los cuestionarios llenados se emplearán para propósitos de investigación. Se mantendrán confidenciales todos los resultados.

Ud. puede hacer comentarios y sugerencias en cada página, y también en la última página del cuestionario.

Ahora, favor de poner su nombre en la primera página, y llenar la página con su Información Personal. Se le avisará cuándo comenzar la primera sección, de dos páginas, sobre síntomas y actuación.

Gracias por su participación en este proyecto.

Table E.3: Personal Information page (questions) - Spanish Language PAQ

Información Personal

Barco _____

Rango _____

Oficio _____

Edad _____ Sexo ..... M ☐ F ☐

Posición de su camarote en el barco ...

_____

¿ Cuánto tiempo lleva navegando, sin contar el tiempo que el barco ha estado en puerto ? (en años) _____

¿ Cuánto tiempo lleva en esta clase de barco ? _____

¿ Cuánto tiempo ha estado atracado al muelle o en tierra antes de comenzar esta sección del ejercicio ? .....(en días) _____

¿ Ud. toma medicina contra el mareo ? ..... sí ☐ no ☐

en caso positivo,

- ¿ qué tipo suele tomar ? ...

  _____

- ¿ qué dosis suele tomar ? ...

  _____

Table E.4: Symptoma page (questions) - Spanish Language PAQ

Síntomas

Fecha _____ Hora _____

Posición _____

Tareas _____

Problemas de dormir antes de esta guardia

0 = ninguno, 3 = serio:	0	1	2	3
mala calidad de sueño	☐	☐	☐	☐
poco sueño	☐	☐	☐	☐
problemas de dormir causados por:				
movimientos del barco	☐	☐	☐	☐
mareo	☐	☐	☐	☐
otras causas: _____	☐	☐	☐	☐

Síntomas experimentados durante esta guardia

0 = ninguno, 3 = serio:	0	1	2	3
fatiga mental	☐	☐	☐	☐
fatiga física	☐	☐	☐	☐
tenía sueño	☐	☐	☐	☐
dolor de cabeza	☐	☐	☐	☐
apatía (no me preocupaba nada)	☐	☐	☐	☐
tensión / ansiedad	☐	☐	☐	☐
vómitos	☐	☐	☐	☐
náusea (no vomitaba)	☐	☐	☐	☐
preocupación por el estómago	☐	☐	☐	☐
otras: _____	☐	☐	☐	☐

¿ Hasta qué punto Ud. se siente mareado ?

0 = muy bien, 10 = muy mal

☺ 😐 ☹

0 1 2 3 4 5 6 7 8 9 10

¿ Está tomando medicina contra el mareo ? sí ☐ no ☐

¿ Vomitó antes de, o durante, esta guardia ? sí ☐ no ☐

En caso positivo, ¿ a qué hora ? _____

¿ cómo se sentía después ?

.... mejor ☐ peor ☐ igual ☐

Table E.5: Performance page (questions) - Spanish Language PAQ

Actuación

Problemas de actuacíon durante esta guardia con: 0 = ninguno, 3 = serio:	0	1	2	3
tomar decisiones	☐	☐	☐	☐
concentración / atención	☐	☐	☐	☐
capacidad de recordar	☐	☐	☐	☐
cumplir tareas fáciles (sumar, deletrear)	☐	☐	☐	☐
sentido de equilibrio	☐	☐	☐	☐
llevar o mover cosas	☐	☐	☐	☐
coordinación manual	☐	☐	☐	☐
visión	☐	☐	☐	☐
otras: _____	☐	☐	☐	☐

Problemas en cumplir tareas durante esta guardia:

hice más errores que normalmente ..... sí ☐ no ☐
tardé más tiempo al hacer las tareas que normalmente ..... sí ☐ no ☐
no terminé las tareas en el tiempo disponible ..... sí ☐ no ☐
tuve que abandonar las tareas ..... sí ☐ no ☐
no me permitieron asumir las tareas ..... sí ☐ no ☐
otras: _____ sí ☐ no ☐

Otros problemas durante la guardia: 0 = ninguno, 3 = serio:	0	1	2	3
catarro, gripe u otras enfermedades ..	☐	☐	☐	☐
calidad de aire (malos olores)	☐	☐	☐	☐
ruidos	☐	☐	☐	☐
vibración	☐	☐	☐	☐
luz (brillante ☐, oscura ☐)	☐	☐	☐	☐
temperatura (caliente☐, fria ☐)	☐	☐	☐	☐
otras: _____	☐	☐	☐	☐

Comentarios _____

_____

Table E.6: General Comments - Spanish Language PAQ

Comentarios Generales

Favor de poner abajo comentarios generales y sugerencias.

Favor de mandar peticiones de información adicional a:
NATO PAQ
Defence Research Establishment Atlantic
PO Box 1012, 9 Grove Street
Dartmouth NS, Canada B2Y 3Z7

Annex F: Daily PAQ completions and null responses

Table F.1: Ship A - PAQ completions and null responses (%)

Day	0	1	2	3	4	5	6	7	8	9	10	11	Ave_all	Ave*
N responses	9	108	131	130	129	126	123	125	122	115	97	22	103.1	122.0
Sleep quality	11.1	2.8	3.1	3.8	3.1	1.6	0.8	1.6	1.6	0.9	1.0	0.0	2.6	1.9
Sleep time	0.0	3.7	2.3	1.5	3.1	2.4	0.8	0.8	1.6	0.0	0.0	0.0	1.4	1.4
Sleep motions	33.3	26.9	17.6	20.8	12.4	7.9	12.2	13.6	13.9	13.0	11.3	13.6	16.4	13.6
Sleep MSI	44.4	29.6	21.4	25.4	20.2	11.9	14.6	16.8	17.2	15.7	16.5	13.6	20.6	17.7
Sleep_other	33.3	36.1	26.7	33.1	27.1	26.2	26.8	24.0	25.4	19.1	27.8	18.2	27.0	26.3
Mental Fatigue	0.0	3.7	1.5	3.1	1.6	1.6	1.6	3.2	0.0	0.0	0.0	0.0	1.4	1.4
Phys. Fatigue	0.0	2.8	0.8	2.3	2.3	1.6	0.8	0.8	0.0	0.0	0.0	0.0	0.9	1.0
Sleepy	0.0	0.9	0.8	0.0	0.0	1.6	1.6	1.6	1.6	0.0	1.0	0.0	0.8	0.9
Headache	0 0	0.9	0.8	1.5	0.0	0.8	0 8	0.8	0.8	0 0	0.0	4.5	0.9	0.6
Apathy	0.0	0.9	0.0	2.3	2.3	0.8	0.8	1.6	0.8	0.9	0.0	0.0	0.9	1.1
Tension	0.0	0.9	0.0	1.5	1.6	0.8	0 8	1.6	0.0	0.0	0.0	0.0	0.6	0.7
Vomit	0.0	0.9	0.0	1.5	1.6	0.8	0.8	1.6	0.0	0.0	0.0	0.0	0.6	0.7
Nausea	0.0	0.9	0 0	1.5	1.6	0.8	0.8	1.6	0.0	0.0	0.0	0.0	0.6	0.7
Stomach	0.0	0.0	0.8	3.8	0.8	0.0	0.8	1.6	0.8	0.0	0.0	0.0	0.7	1.0
Sympt_other	0.0	19.4	19.1	16.2	21 7	21.4	19.5	17.6	20.5	20.9	20 6	13.6	17.5	19.7
Decisions	0.0	0.9	0.0	0.8	0.0	0.0	0.8	0.0	1.6	0.0	0.0	0.0	0.3	0 4
Concentration	0.0	0.0	0.0	0.8	0 0	0.0	0.8	0.0	0.8	0.0	1.0	0.0	0.3	0.4
Memory	0 0	0.0	0.0	0 8	0.0	0 0	0.8	0.0	1.6	0.0	1.0	0.0	0.4	0.5
Simple Tasks	0 0	0.9	0.0	0.8	0 0	0.0	0 8	0.0	0.8	0.0	0.0	0.0	0.3	0.3
Body Motions	0.0	0 0	0.8	0.8	1.6	0 0	0.8	0.8	1.6	0.9	1.0	4 5	1.1	0.9
Carry / move	0.0	0.0	0.0	0.8	0 0	0 0	0 8	1.6	0.8	0.0	0.0	0.0	0.3	0.4
Hand coord	0.0	0.0	0.0	0.8	0.0	0.0	0 8	0.8	0.8	0 0	0.0	0.0	0.3	0.4
Vision	0.0	0 9	0.0	0.8	0.0	0.0	0.8	0.8	0.8	0.9	2.1	0.0	0.6	0.7
Perf_other	33.3	35.2	22.9	23.8	24.0	21.4	20.3	16.0	22.1	20.9	21.6	9 1	22.6	21.5
More mistakes	0.0	1.9	0 8	0.8	2.3	1.6	2.4	1.6	3.3	1.7	0.0	0.0	1.4	1.6
Took Longer	0 0	1.9	0.8	0.8	1.6	1.6	2.4	1.6	2.5	1.7	0.0	0.0	1.2	1.4
Not completed	0.0	1.9	0.8	0.8	1.6	1.6	2.4	1.6	2.5	1.7	0.0	0.0	1.2	1.4
Abandoned	0.0	1.9	0.0	0.8	1.6	1.6	2.4	1.6	2.5	1.7	0.0	0.0	1.2	1.3
Not attempted	11.1	11.1	6.9	5 4	5.4	6 3	5.7	5.6	5.7	7.0	2.1	0.0	6.0	5.6
Task_other	22.2	31.5	17.6	15.4	16.3	15.9	15 4	9.6	18 0	17.4	16.5	4.5	16.7	15.8
Cold,Flu	0 0	1.9	1.5	0.8	1.6	1.6	1.6	0.0	0.8	0.0	1.0	0.0	0.9	1.0
Air Quality	0.0	0.9	1.5	0.8	0.8	1.6	3.3	1.6	2.5	1.7	3.1	4.5	1.9	1.9
Noise	0.0	0.9	1.5	0.8	0.0	2.4	1.6	0.0	0.8	0.0	0.0	0.0	0.7	0.8
Vibration	0 0	0.9	3.1	0.8	0.8	0.0	1.6	0.8	0.8	0.0	0.0	0.0	0.7	0.9
Bright	77.8	83.3	82.4	75 4	75 2	78.6	79 7	77.6	77.9	80 9	82.5	77.3	79.0	78.9
Dark	66.7	75.0	73.3	68.5	69.0	69.8	74.0	71.2	72.1	73.9	77.3	77.3	72.3	72.1
Hot	100.0	93.5	89.3	88.5	89.9	91.3	88.6	88.0	91.0	91.3	90.7	95.5	91.5	89.8
Cold	66.7	80.6	75.6	74.6	76.0	77.0	78.0	78.4	79.5	83.5	78.4	86.4	77.9	77.9
other	33.3	32.4	32 1	27.7	29.5	27 8	30.1	27.2	27.9	24.3	22.7	13.6	27.4	27.7

Note: **N responses** is number PAQ completions, **Ave_all** is average over all days, and **Ave*** is average over days 1.5 through 10.5

Table F.2: Ship B - PAQ completions and null responses (%)

Day	0	1	2	3	4	5	6	7	8	9	10	11	Ave_all	Ave*
N responses	3	66	70	67	59	62	68	74	52	47	44	20	52.7	60.3
Sleep quality	0.0	1.5	2.9	4.5	3.4	4.8	1.5	2.7	3.8	2.1	4.5	0.0	2.8	3.4
Sleep time	0.0	4.5	2.9	4.5	1.7	4.8	1.5	4.1	3.8	2.1	2.3	0.0	2.7	3.1
Sleep motions	0.0	16.7	8.6	6.0	3.4	6.5	2.9	4.1	3.8	4.3	4.5	5.0	5.5	4.9
Sleep MSI	0.0	24.2	12.9	9.0	10.2	9.7	7.4	6.8	9.6	6.4	11.4	5.0	9.4	9.2
Sleep_other	66.7	39.4	47.1	46.3	61.0	56.5	58.8	63.5	65.4	53.2	56.8	40.0	54.6	56.5
Mental Fatigue	0.0	1.5	0.0	1.5	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3
Phys. Fatigue	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
Sleepy	0.0	1.5	0.0	1.5	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3
Headache	0.0	1.5	0.0	1.5	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3
Apathy	0.0	1.5	1.4	3.0	1.7	3.2	1.5	1.4	1.9	2.1	2.3	0.0	1.7	2.1
Tension	0.0	3.0	1.4	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.8	0.7
Vomit	0.0	1.5	0.0	1.5	1.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
Nausea	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
Stomach	0.0	1.5	0.0	1.5	0.0	1.6	2.9	1.4	0.0	0.0	2.3	0.0	0.9	1.1
Sympt_other	100.0	54.5	57.1	62.7	62.7	62.9	69.1	67.6	65.4	57.4	56.8	40.0	63.0	62.4
Decisions	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Concentration	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Memory	0.0	0.0	0.0	1.5	0.0	1.6	0.0	1.4	1.9	0.0	0.0	0.0	0.5	0.7
Simple Tasks	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Body Motions	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Carry / move	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Hand coord	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Vision	0.0	0.0	0.0	1.5	0.0	3.2	1.5	0.0	3.8	0.0	0.0	0.0	0.8	1.1
Perf_other	100.0	54.5	54.3	62.7	66.1	69.4	67.6	67.6	69.2	66.0	61.4	40.0	64.9	64.9
More mistakes	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Took Longer	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Not completed	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Abandoned	0.0	0.0	0.0	1.5	0.0	1.6	0.0	0.0	1.9	0.0	0.0	0.0	0.4	0.6
Not attempted	0.0	1.5	0.0	1.5	0.0	3.2	0.0	0.0	1.9	0.0	0.0	0.0	0.7	0.7
Task_other	100.0	57.6	42.9	47.8	45.8	45.2	51.5	35.1	42.3	42.6	34.1	25.0	47.5	43.0
Cold,Flu	0.0	0.0	0.0	1.5	0.0	4.8	1.5	0.0	3.8	4.3	0.0	0.0	1.3	1.8
Air Quality	0.0	0.0	0.0	1.5	0.0	4.8	1.5	0.0	3.8	4.3	0.0	0.0	1.3	1.8
Noise	0.0	0.0	0.0	1.5	0.0	4.8	1.5	0.0	3.8	4.3	0.0	0.0	1.3	1.8
Vibration	0.0	0.0	0.0	3.0	0.0	6.5	2.9	0.0	3.8	4.3	0.0	0.0	1.7	2.3
Bright	100.0	78.8	72.9	76.1	74.6	77.4	79.4	79.7	76.9	76.6	77.3	75.0	78.7	76.8
Dark	33.3	84.8	88.6	85.1	84.7	83.9	83.8	86.5	84.6	83.0	86.4	95.0	81.6	85.2
Hot	100.0	93.9	95.7	91.0	94.9	93.5	92.6	94.6	94.2	95.7	90.9	90.0	93.9	93.7
Cold	0.0	53.0	64.3	59.7	62.7	64.5	63.2	68.9	63.5	55.3	56.8	70.0	56.8	62.1
other	100.0	68.2	61.4	71.6	66.1	75.8	66.2	75.7	73.1	68.1	59.1	55.0	70.0	68.6

Note: **N responses** is number PAQ completions, **Ave_all** is average over all days, and **Ave*** is average over days 1.5 through 10.5

Table F.3: Ship C - PAQ completions and null responses (%)

Day	0	1	2	3	4	5	6	7	8	9	10	11	Ave_all	Ave*
N responses	66	255	282	291	305	313	308	309	302	295	231	49	250.5	292.9
Sleep quality	4.5	3.1	2.5	1.4	2.6	2.2	3.9	2.3	2.0	2.4	2.2	0.0	2.4	2.4
Sleep time	4.5	3.9	3.2	1.0	3.6	2.2	2.9	2.9	2.0	2.4	2.2	0.0	2.6	2.5
Sleep motions	21.2	11.0	8.5	7.6	6.2	5.4	4.5	5.5	4.3	5.4	4.3	4.1	7.3	5.6
Sleep MSI	24.2	16.9	12.4	14.1	12.1	12.1	8.8	8.1	7.3	8.1	7.8	10.2	11.8	10.1
Sleep_other	36.4	35.3	37.6	41.2	44.9	44.7	49.0	46.9	49.3	46.1	45.9	55.1	44.4	45.1
Mental Fatigue	3.0	0.8	1.4	1.4	0.7	0.6	1.6	0.3	0.7	0.3	0.4	0.0	0.9	0.8
Phys. Fatigue	0.0	1.2	0.7	1.0	0.7	0.6	1.3	0.0	0.3	0.0	0.0	0.0	0.5	0.5
Sleepy	1.5	0.4	1.1	0.7	0.7	0.6	1.3	0.0	1.0	0.0	0.0	0.0	0.6	0.6
Headache	1.5	1.6	1.1	1.4	1.0	0.6	1.3	0.6	0.7	0.3	0.4	0.0	0.9	0.8
Apathy	3.0	1.2	1.4	1.4	0.7	1.3	1.3	0.6	1.0	0.0	0.4	0.0	1.0	0.9
Tension	1.5	2.4	0.7	1.4	0.7	1.0	1.3	0.0	0.3	0.0	0.4	0.0	0.8	0.6
Vomit	1.5	2.0	1.1	1.7	0.7	1.6	1.3	0.3	0.7	0.0	0.0	0.0	0.9	0.8
Nausea	1.5	1.6	1.1	1.7	1.3	1.0	1.3	0.0	0.3	0.0	0.0	0.0	0.8	0.7
Stomach	1.5	2.0	1.1	2.1	1.6	1.3	1.9	0.0	0.7	0.3	0.0	0.0	1.0	1.0
Sympt_other	31.8	45.5	45.0	44.7	45.9	45.4	49.7	48.5	51.3	48.8	51.1	55.1	46.9	47.8
Decisions	0.0	0.0	0.4	0.7	0.3	1.0	1.0	0.3	0.3	0.3	1.3	0.0	0.5	0.6
Concentration	0.0	0.0	0.4	0.7	0.3	0.6	1.0	0.3	0.3	0.0	1.3	0.0	0.4	0.5
Memory	0.0	0.0	0.4	0.7	0.3	0.6	1.3	0.3	1.0	0.0	1.7	0.0	0.5	0.7
Simple Tasks	0.0	0.0	0.4	0.7	0.3	1.0	1.0	0.3	0.3	0.0	1.3	0.0	0.4	0.6
Body Motions	0.0	0.0	0.7	0.7	0.3	1.3	1.0	0.3	0.3	0.0	1.3	0.0	0.5	0.7
Carry / move	0.0	0.0	0.7	1.0	0.7	0.6	1.0	0.3	0.7	0.0	1.7	0.0	0.6	0.7
Hand coord	0.0	0.0	0.7	0.7	0.7	0.6	1.3	0.6	0.3	0.0	1.3	2.0	0.7	0.7
Vision	0.0	0.4	1.8	1.0	0.3	1.0	1.3	0.3	1.0	0.7	2.2	0.0	0.8	1.1
Perf_other	34.8	43.9	44.7	46.0	50.2	49.5	51.6	50.5	51.7	50.2	49.4	61.2	48.6	49.3
More mistakes	0.0	0.0	1.1	0.7	0.7	1.0	1.0	1.0	1.0	0.3	1.7	0.0	0.7	0.9
Took Longer	0.0	0.0	0.7	0.7	1.3	0.6	1.0	0.6	1.0	0.3	1.7	0.0	0.7	0.9
Not completed	0.0	0.4	0.7	0.7	1.0	0.6	1.0	0.3	1.0	0.0	1.7	0.0	0.6	0.8
Abandoned	0.0	0.0	0.7	0.7	1.0	1.0	1.0	0.3	1.0	0.0	1.7	0.0	0.6	0.8
Not attempted	0.0	0.0	1.4	0.7	1.3	1.3	1.0	0.3	1.0	0.0	1.7	0.0	0.7	1.0
Task_other	30.3	35.3	31.9	28.2	25.2	26.5	26.9	22.0	24.8	20.3	23.8	26.5	26.8	25.5
Cold,Flu	0.0	2.0	2.5	1.0	1.0	1.9	1.6	0.6	1.3	0.0	2.2	0.0	1.2	1.4
Air Quality	1.5	0.8	1.4	0.7	1.0	1.3	1.0	0.3	1.3	0.0	2.2	0.0	1.0	1.0
Noise	0.0	0.4	1.4	0.7	1.0	1.0	1.3	0.6	1.0	0.0	2.6	0.0	0.8	1.1
Vibration	0.0	2.4	1.8	1.0	1.3	1.0	1.3	0.3	1.3	0.0	2.2	0.0	1.0	1.1
Bright	78.8	79.6	83.0	84.5	82.6	83.1	84.1	82.5	81.8	84.4	82.3	73.5	81.7	83.1
Dark	63.6	62.7	62.8	65.6	63.9	63.3	65.6	63.8	66.2	65.4	64.9	59.2	63.9	64.6
Hot	81.8	85.5	89.7	90.0	88.9	90.4	91.6	88.0	88.7	88.8	91.3	83.7	88.2	89.7
Cold	57.6	56.5	60.3	62.5	62.0	61.7	62.7	63.1	64.6	64.7	66.2	63.3	62.1	63.1
other	37.9	49.4	53.2	51.5	50.2	49.2	52.9	51.8	53.6	49.2	55.0	61.2	51.3	51.8

Note: **N responses** is number PAQ completions, **Ave_all** is average over all days, and **Ave*** is average over days 1.5 through 10.5

Table F.4: Ship D - PAQ completions and null responses (%)

Day	0	1	2	3	4	5	6	7	8	9	10	11	Ave_all	Ave*
N responses	2	97	302	319	318	316	312	321	307	306	252	6	238.2	305.9
Sleep quality	0.0	2.1	1.0	1.6	1.6	1.3	2.2	1.2	1.0	0.7	2.0	0.0	1.2	1.4
Sleep time	0.0	3.1	1.7	0.9	1.9	1.6	2.2	1.6	1.3	1.3	2.0	0.0	1.5	1.6
Sleep motions	0.0	18.6	15.2	12.5	7.9	4.4	6.4	4.4	6.5	4.2	7.5	0.0	7.3	7.7
Sleep MSI	0.0	18.6	18.9	15.0	12.3	9.2	11.2	9.0	10.7	7.8	10.7	0.0	10.3	11.7
Sleep_other	50.0	35.1	40.1	39.2	39.3	43.0	46.8	46.7	43.3	47.7	44.4	66.7	45.2	43.4
Mental Fatigue	0.0	0.0	1.0	1.3	1.6	0.0	0.3	0.0	0.3	0.0	1.2	0.0	0.5	0.6
Phys. Fatigue	0.0	0.0	0.7	0.9	1.9	0.3	0.3	0.0	0.3	0.0	1.2	0.0	0.5	0.6
Sleepy	0.0	0.0	1.0	1.3	0.9	0.0	0.3	0.0	0.3	0.0	1.2	0.0	0.4	0.6
Headache	0.0	0.0	0.7	0.6	1.3	0.6	0.3	0.0	1.0	0.0	1.2	0.0	0.5	0.6
Apathy	0.0	0.0	1.0	1.3	0.9	0.0	0.6	0.6	0.7	0.0	1.6	0.0	0.6	0.7
Tension	0.0	0.0	0.0	0.6	1.3	0.6	0.3	0.3	0.7	0.0	1.6	0.0	0.4	0.6
Vomit	0.0	0.0	1.0	0.6	1.6	0.3	0.3	0.3	0.7	0.0	1.6	0.0	0.5	0.7
Nausea	0.0	0.0	0.3	0.6	1.6	0.3	0.3	0.9	0.7	0.0	1.6	0.0	0.5	0.7
Stomach	0.0	3.1	0.7	0.9	1.6	0.6	0.6	0.6	1.0	0.3	2.0	0.0	1.0	0.9
Sympt_other	50.0	44.3	50.7	47.6	51.9	50.9	51.3	50.2	49.5	49.0	50.4	66.7	51.0	50.2
Decisions	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.3	0.3	1.2	0.0	0.2	0.3
Concentration	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.3	0.3	1.2	0.0	0.2	0.3
Memory	0.0	0.0	0.0	0.0	0.9	0.0	0.6	0.0	0.3	0.3	1.2	0.0	0.3	0.4
Simple Tasks	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.3	0.3	0.3	1.2	0.0	0.3	0.3
Body Motions	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.7	0.3	1.2	0.0	0.3	0.3
Carry / move	0.0	1.0	0.0	0.0	0.6	0.0	0.3	0.0	0.7	0.3	1.2	0.0	0.3	0.3
Hand coord	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.3	0.3	1.2	0.0	0.2	0.3
Vision	0.0	1.0	0.3	0.6	1.3	0.6	0.3	0.6	0.7	0.7	1.6	0.0	0.6	0.7
Perf_other	100.0	49.5	55.3	49.8	53.5	52.5	49.4	52.0	50.2	48.4	50.0	66.7	56.4	51.2
More mistakes	0.0	0.0	0.3	0.3	0.6	0.3	1.0	0.6	1.0	1.3	2.0	0.0	0.6	0.8
Took Longer	0.0	0.0	0.3	0.3	0.6	0.0	0.3	0.0	0.3	0.3	1.6	0.0	0.3	0.4
Not completed	0.0	0.0	0.3	0.6	0.6	0.0	1.0	0.0	0.3	0.3	1.6	0.0	0.4	0.5
Abandoned	0.0	0.0	0.3	0.3	0.9	0.3	0.6	0.3	0.3	0.3	1.6	0.0	0.4	0.6
Not attempted	0.0	0.0	1.3	1.3	2.2	1.3	1.3	0.9	1.6	1.6	2.8	0.0	1.2	1.6
Task_other	0.0	49.5	49.0	37.0	39.6	35.8	30.8	29.3	29.3	25.2	27.0	33.3	32.1	33.7
Cold,Flu	0.0	1.0	0.7	0.3	1.3	0.0	0.3	0.3	0.7	0.3	2.0	0.0	0.6	0.6
Air Quality	0.0	0.0	0.0	0.0	0.6	0.0	0.3	0.0	0.3	0.3	2.0	0.0	0.3	0.4
Noise	0.0	0.0	0.3	0.0	1.3	0.3	0.6	0.6	0.7	0.3	2.0	0.0	0.5	0.7
Vibration	0.0	4.1	1.7	0.9	1.9	1.3	1.0	1.6	1.0	1.0	2.4	0.0	1.4	1.4
Bright	100.0	71.1	74.8	78.7	77.0	75.0	75.6	74.8	79.2	78.4	78.2	100.0	80.2	76.9
Dark	50.0	80.4	72.2	74.9	74.8	78.5	77.2	79.1	79.2	80.1	83.3	100.0	77.5	77.7
Hot	100.0	73.2	77.8	76.5	74.8	71.2	74.0	73.2	76.9	78.8	80.2	100.0	79.7	75.9
Cold	100.0	85.6	73.2	79.9	81.4	84.5	81.4	83.2	84.7	84.3	84.1	100.0	85.2	81.9
other	50.0	59.8	62.6	55.2	57.2	54.7	53.5	55.1	53.4	52.3	53.2	50.0	54.8	55.3

Note: **N responses** is number PAQ completions, **Ave_all** is average over all days, and **Ave*** is average over days 1.5 through 10.5

Table F.5: Ship E - PAQ completions and null responses (%)

Day	0	1	2	3	4	5	6	7	8	9	10	11	Ave_all	Ave*
N responses	3	507	583	587	589	604	575	591	586	581	577	157	496.0	585.9
Sleep quality	0.0	3.6	1.2	1.2	1.4	2.3	1.7	2.0	2.0	1.9	2.1	6.4	2.1	1.8
Sleep time	0.0	3.6	1.4	1.7	1.7	2.3	1.6	2.2	1.9	1.9	2.1	5.1	2.1	1.9
Sleep motions	0.0	20.3	11.1	10.4	5.9	7.1	4.5	6.6	8.0	5.9	6.6	7.6	7.8	7.4
Sleep MSI	0.0	21.7	12.5	11.4	9.2	9.6	7.8	9.3	9.7	7.9	8.8	10.8	9.9	9.6
Sleep_other	33.3	33.5	32.1	33.9	30.7	32.0	32.9	32.7	30.4	32.2	32.9	30.6	32.3	32.2
Mental Fatigue	0.0	0.8	0.3	0.5	0.3	0.3	1.4	0.2	0.5	0.9	1.0	5.7	1.0	0.6
Phys. Fatigue	0.0	1.0	0.2	0.5	0.3	0.3	1.2	0.2	0.5	1.0	0.9	5.7	1.0	0.6
Sleepy	0.0	0.6	0.2	0.3	0.5	0.3	1.0	0.2	0.5	0.9	1.0	5.1	0.9	0.6
Headache	0.0	1.0	0.3	0.5	0.2	0.3	1.2	0.0	0.3	1.0	0.9	5.7	1.0	0.5
Apathy	0.0	1.2	0.5	0.5	0.2	0.7	1.4	0.5	0.5	1.0	1.2	5.1	1.1	0.7
Tension	0.0	1.0	0.3	0.5	0.0	0.7	1.2	0.2	0.3	0.9	1.0	5.1	0.9	0.6
Vomit	0.0	1.0	0.3	0.5	0.3	0.7	1.0	0.0	0.3	0.9	1.0	5.1	0.9	0.6
Nausea	0.0	0.8	0.3	0.5	0.3	0.5	1.0	0.0	0.3	1.0	0.9	5.1	0.9	0.6
Stomach	0.0	1.2	0.5	1.0	0.5	0.7	1.4	0.3	1.2	1.7	1.2	5.1	1.2	1.0
Sympt_other	33.3	32.3	34.0	34.1	33.8	35.1	34.3	32.3	30.9	30.1	30.5	30.6	32.6	32.8
Decisions	0.0	0.2	0.0	0.2	0.0	0.5	0.9	0.2	0.5	0.9	1.2	5.1	0.8	0.5
Concentration	0.0	0.2	0.0	0.2	0.0	0.7	0.9	0.2	0.5	0.9	1.2	5.1	0.8	0.5
Memory	0.0	0.6	0.0	0.2	0.0	0.7	1.0	0.5	0.5	0.9	1.2	5.1	0.9	0.6
Simple Tasks	0.0	0.2	0.0	0.2	0.0	0.5	1.0	0.7	0.5	1.0	1.2	5.1	0.9	0.6
Body Motions	0.0	0.2	0.0	0.2	0.3	0.5	0.9	0.5	0.5	1.0	1.2	5.1	0.9	0.6
Carry / move	0.0	0.4	0.0	0.2	0.3	0.5	1.0	0.3	0.7	0.9	1.0	5.1	0.9	0.6
Hand coord	0.0	0.6	0.0	0.2	0.0	0.8	0.9	0.5	0.7	1.0	1.2	5.1	0.9	0.6
Vision	0.0	0.4	0.5	0.3	0.3	1.0	1.0	0.7	1.2	1.4	1.4	5.7	1.2	0.9
Perf_other	33.3	36.5	34.5	32.9	34.6	35.9	33.9	32.7	29.9	32.0	31.2	29.3	33.1	33.1
More mistakes	0.0	0.2	0.0	0.7	0.3	0.8	0.9	0.8	0.9	1.0	2.1	5.7	1.1	0.8
Took Longer	0.0	0.2	0.2	0.3	0.3	1.0	0.9	0.7	0.7	0.9	1.6	5.7	1.0	0.7
Not completed	0.0	0.2	0.2	0.3	0.2	0.8	0.9	0.3	0.9	0.9	1.6	5.7	1.0	0.7
Abandoned	0.0	0.2	0.2	0.7	0.3	1.0	1.2	0.3	1.2	1.0	1.6	6.4	1.2	0.8
Not attempted	0.0	2.0	0.5	0.7	0.5	1.2	1.0	0.5	1.0	0.9	1.6	7.0	1.4	0.9
Task_other	33.3	31.4	28.6	21.1	23.1	22.0	21.4	18.8	18.8	20.1	19.2	22.3	23.3	21.5
Cold,Flu	0.0	0.4	0.3	0.5	0.2	0.3	1.4	0.3	1.0	1.2	1.4	6.4	1.1	0.7
Air Quality	0.0	0.2	0.3	0.7	0.2	0.8	1.4	0.3	1.0	1.2	1.2	6.4	1.1	0.8
Noise	0.0	1.0	0.3	0.5	0.3	0.3	1.0	0.3	1.0	1.0	1.2	6.4	1.1	0.7
Vibration	0.0	1.8	0.7	1.0	0.7	1.0	1.2	0.7	1.2	1.4	1.2	6.4	1.4	1.0
Bright	66.7	61.1	63.6	63.0	63.5	63.9	67.7	67.7	67.9	68.5	68.6	63.1	65.4	66.1
Dark	100.0	82.8	78.0	77.9	78.4	77.5	76.9	77.2	80.4	79.2	81.3	82.8	81.0	78.5
Hot	66.7	80.9	83.7	82.6	82.3	80.6	80.9	82.6	83.8	84.3	83.2	79.0	80.9	82.7
Cold	100.0	75.0	67.9	71.0	69.4	70.2	72.2	71.2	73.5	73.0	74.5	73.2	74.3	71.5
other	66.7	53.8	51.6	50.9	50.4	49.2	50.3	49.6	48.8	47.7	48.0	48.4	51.3	49.6

Note: **N responses** is number PAQ completions, **Ave_all** is average over all days, and **Ave*** is average over days 1.5 through 10.5

Table F.6: Ship F - PAQ completions and null responses (%)

Day	0	1	2	3	4	5	6	7	8	9	10	11	Ave_all	Ave*
N responses	9	134	150	151	147	147	148	143	137	145	124	44	123.3	143.6
Sleep quality	0.0	1.5	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Sleep time	0.0	4.5	1.3	2.6	0.7	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.9	0.7
Sleep motions	0.0	10.4	5.3	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.0	2.3	1.6	0.7
Sleep MSI	0.0	14.9	5.3	3.3	1.4	1.4	2.0	0.0	1.5	2.1	3.2	4.5	3.3	2.2
Sleep_other	22.2	21.6	28.0	31.8	29.3	31.3	31.1	36.4	37.2	36.6	37.9	34.1	31.5	33.3
Mental Fatigue	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.2
Phys. Fatigue	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Sleepy	0.0	0.0	1.3	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3
Headache	0.0	0.7	0.7	2.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4
Apathy	0.0	1.5	0.7	0.0	1.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3
Tension	0.0	1.5	0.7	1.3	0.7	0.7	0.0	0.7	0.0	0.7	0.0	0.0	0.5	0.5
Vomit	0.0	1.5	0.7	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2
Nausea	0.0	0.7	0.7	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Stomach	0.0	0.7	0.7	0.7	0.7	1.4	0.0	0.0	0.0	0.7	0.0	0.0	0.4	0.5
Sympt_other	55.6	38.8	41.3	40.4	38.8	38.8	35.1	41.3	41.6	40.7	37.1	31.8	40.1	39.5
Decisions	0.0	0.7	0.7	0.0	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.2
Concentration	0.0	0.0	1.3	0.0	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.3
Memory	0.0	0.7	1.3	0.0	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.3	0.3
Simple Tasks	0.0	0.0	0.7	0.0	0.0	0.7	0.0	1.4	0.0	0.0	0.0	0.0	0.2	0.3
Body Motions	0.0	0.0	0.7	0.0	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.2
Carry / move	0.0	0.7	0.7	0.0	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.2
Hand coord	0.0	0.0	0.7	0.0	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.2
Vision	0.0	0.7	1.3	0.7	0.7	1.4	0.7	1.4	0.7	0.0	0.8	0.0	0.7	0.8
Perf_other	44.4	42.5	40.7	44.4	38.8	40.1	37.2	44.1	40.9	44.1	39.5	29.5	40.5	41.1
More mistakes	0.0	0.0	0.7	2.0	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.3	0.4
Took Longer	0.0	0.0	0.7	1.3	0.0	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.3	0.4
Not completed	0.0	0.0	0.7	0.0	0.0	0.7	0.0	0.7	0.0	0.7	0.0	0.0	0.2	0.3
Abandoned	11.1	0.0	0.7	0.0	0.0	0.7	0.0	0.7	0.0	0.7	0.8	0.0	1.2	0.4
Not attempted	0.0	1.5	0.7	0.7	0.0	0.7	1.4	0.7	0.0	0.7	0.8	0.0	0.6	0.6
Task_other	44.4	41.8	37.3	29.8	28.6	32.7	27.0	25.2	27.0	22.8	19.4	22.7	29.9	27.7
Cold,Flu	0.0	1.5	0.7	0.7	0.0	1.4	0.0	0.0	0.0	0.0	0.8	0.0	0.4	0.4
Air Quality	0.0	0.7	0.7	0.7	0.0	1.4	0.0	0.0	0.0	0.0	0.8	0.0	0.4	0.4
Noise	0.0	0.0	1.3	0.7	0.0	1.4	0.0	2.1	0.0	0.0	0.8	0.0	0.5	0.7
Vibration	0.0	4.5	2.7	0.7	0.0	2.0	0.0	1.4	0.7	0.7	0.0	0.0	1.1	0.9
Bright	66.7	57.5	58.0	60.9	57.1	58.5	65.5	61.5	61.3	62.8	62.9	61.4	61.2	61.0
Dark	77.8	77.6	76.7	78.1	75.5	75.5	72.3	75.5	76.6	74.5	73.4	70.5	75.3	75.4
Hot	100.0	76.1	78.0	72.8	74.8	74.8	76.4	75.5	75.2	76.6	73.4	75.0	77.4	75.3
Cold	33.3	47.0	42.7	52.3	50.3	50.3	54.7	50.3	52.6	51.0	50.0	45.5	48.3	50.5
other	44.4	51.5	47.3	49.0	44.2	47.6	46.6	46.9	43.1	44.1	40.3	40.9	45.5	45.5

Note: **N responses** is number PAQ completions, **Ave_all** is average over all days, and **Ave*** is average over days 1.5 through 10.5

Table F.7: Ship G - PAQ completions and null responses (%)

Day	0	1	2	3	4	5	6	7	8	9	10	11	Ave_all	Ave*
N responses	40	183	192	197	182	190	178	183	172	174	108	1	150.0	175.1
Sleep quality	2.5	4.4	2.6	3.0	3.3	3.7	2.2	2.2	4.1	2.9	2.8	0.0	2.8	3.0
Sleep time	0.0	3.8	3.1	4.1	3.8	3.7	2.2	2.2	3.5	2.9	2.8	0.0	2.7	3.1
Sleep motions	7.5	12.0	7.3	6.1	4.9	6.3	3.4	4.4	6.4	4.0	5.6	0.0	5.7	5.4
Sleep MSI	15.0	22.4	13.5	11.7	11.0	11.1	7.9	9.8	11.6	7.5	11.1	0.0	11.0	10.6
Sleep_other	27.5	40.4	37.5	43.7	39.0	39.5	35.4	39.9	38.4	35.1	41.7	0.0	34.8	38.9
Mental Fatigue	5.0	1.1	0.5	0.0	0.0	0.5	0.0	0.0	0.6	0.0	0.9	0.0	0.7	0.3
Phys. Fatigue	2.5	1.6	0.0	0.0	1.1	0.0	0.0	0.5	0.6	0.0	0.9	0.0	0.6	0.4
Sleepy	0.0	1.6	0.5	0.0	0.5	0.5	0.0	0.0	0.6	0.0	1.9	0.0	0.5	0.4
Headache	5.0	0.5	0.5	0.0	0.5	0.5	0.6	0.5	0.6	0.6	0.9	0.0	0.9	0.5
Apathy	2.5	1.6	0.5	0.5	1.1	1.1	0.0	0.0	0.6	1.1	0.9	0.0	0.8	0.8
Tension	5.0	2.2	0.5	0.0	1.1	0.0	0.0	0.5	0.6	0.6	0.9	0.0	1.0	0.5
Vomit	2.5	1.6	1.0	0.5	0.5	0.5	0.6	0.5	0.6	0.0	0.9	0.0	0.8	0.6
Nausea	5.0	1.6	0.5	0.0	0.5	0.0	0.6	0.5	0.6	0.6	0.9	0.0	0.9	0.5
Stomach	0.0	2.2	0.5	0.0	0.0	0.0	0.0	0.5	0.6	0.0	0.9	0.0	0.4	0.3
Sympt_other	45.0	47.5	40.1	43.7	40.1	41.6	42.1	43.2	38.4	42.0	41.7	0.0	38.8	41.4
Decisions	2.5	0.5	0.0	0.5	0.5	0.0	0.6	0.5	1.2	0.6	0.9	0.0	0.7	0.5
Concentration	2.5	0.0	0.0	0.0	0.0	0.0	0.6	0.5	1.2	0.6	0.9	0.0	0.5	0.4
Memory	2.5	0.0	0.0	0.0	0.0	0.0	0.6	0.5	1.2	0.6	0.9	0.0	0.5	0.4
Simple Tasks	2.5	0.0	0.0	0.0	0.5	0.0	0.6	0.5	1.2	0.6	0.9	0.0	0.6	0.5
Body Motions	2.5	0.0	0.0	0.5	0.0	0.0	0.6	0.5	1.2	0.6	0.9	0.0	0.6	0.5
Carry / move	2.5	0.5	0.5	0.0	0.5	0.5	0.6	0.5	1.2	1.1	1.9	0.0	0.8	0.8
Hand coord	2.5	0.0	0.0	0.0	0.5	0.0	0.6	0.5	1.2	0.6	0.9	0.0	0.6	0.5
Vision	2.5	0.5	0.0	0.0	0.0	0.0	1.1	1.1	1.7	0.6	1.9	0.0	0.8	0.7
Perf_other	37.5	45.4	38.5	45.2	42.3	41.6	44.4	43.7	43.0	42.5	44.4	0.0	39.0	42.9
More mistakes	2.5	0.5	0.0	0.5	0.5	0.5	2.2	0.5	1.2	0.6	1.9	0.0	0.9	0.9
Took Longer	2.5	1.1	0.0	0.5	0.0	0.5	2.2	0.5	1.2	0.6	0.9	0.0	0.8	0.7
Not completed	2.5	1.1	0.0	0.5	0.0	0.5	2.2	0.5	1.2	0.6	0.9	0.0	0.8	0.7
Abandoned	2.5	1.6	0.0	0.5	0.5	0.5	2.2	0.5	1.2	0.6	0.9	0.0	0.9	0.8
Not attempted	2.5	1.1	0.5	1.0	0.5	1.6	2.8	0.5	1.7	1.1	1.9	0.0	1.3	1.3
Task_other	40.0	45.9	33.3	35.5	26.9	25.8	25.8	23.0	20.9	21.3	27.8	0.0	27.2	26.7
Cold,Flu	2.5	0.0	1.0	0.5	1.1	0.5	1.1	0.5	1.2	0.6	0.9	0.0	0.8	0.8
Air Quality	5.0	0.5	1.0	0.0	0.0	0.0	1.1	0.5	1.2	0.6	0.9	0.0	0.9	0.6
Noise	2.5	0.0	0.5	0.0	0.0	0.0	1.1	1.1	2.3	0.6	0.9	0.0	0.8	0.7
Vibration	2.5	0.0	2.1	0.0	0.5	0.0	1.7	1.1	2.3	1.1	0.9	0.0	1.0	1.1
Bright	75.0	68.9	71.9	70.1	77.5	67.9	71.9	70.5	74.4	74.1	72.2	100.0	74.5	72.3
Dark	85.0	82.0	83.3	84.3	80.2	82.6	80.9	79.2	80.2	82.8	81.5	100.0	83.5	81.7
Hot	85.0	82.5	82.8	83.8	83.5	82.6	82.6	81.4	84.3	86.2	87.0	100.0	85.1	83.8
Cold	67.5	69.4	75.0	74.6	74.7	71.1	74.7	72.1	73.8	71.3	70.4	100.0	74.6	73.1
other	50.0	57.9	44.8	50.8	45.1	47.9	47.2	47.5	45.3	45.4	49.1	0.0	44.2	47.0

Note: **N responses** is number PAQ completions, **Ave_all** is average over all days, and **Ave*** is average over days 1.5 through 10.5

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The NATO Performance Assessment Questionnaire (PAQ) was developed to obtain a large database on fatigue, motion sickness and task performance problems associated with ship motions in the naval environment. The PAQ was deployed on seven ships of the NATO Standing Naval Forces Atlantic fleet (STANAVFORLANT), during combat training exercises in February and March of 1997. Overall, 1026 personnel returned PAQ booklets completed over an 11 day period, providing a very large database on fatigue and motion sickness symptomatology, and on coincidental task performance problems. Additionally, two ships were instrumented to measure motions. This Technical Memorandum documents the PAQ physical format and content, including all five languages used in the NATO deployment. Response rates from each ship are defined, and personnel demographics are summarized. The entry of data from PAQ booklets into a computer database is described, and a reliability assessment of responses from each ship is presented.

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task performance
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PAQ